A STUDY

OF

SOUTH ASIAN CRANIA

by

ANGEL'S METHOD OF MORPHOLOGICAL TYPE ANALYSIS

being

A Thesis for the degree of Ph.D. of
the University of Edinburgh

by

KUNWAR BIRENDRA SINGH, M.S.

AGRA UNIVERSITY, INDIA.

Vol. I. Text.

CONTENTS

The study of South Asian Crania is of particular interest for a number of reasons. On the one hand the cultural peculiarities and wide differences in the dialects suggest that the people have been isolated for a long period. This is also the view of Risley (1915) who says about the Indian peninsula, 'No where else in the world do we find the population of a large continent broken up into an infinite number of mutually exclusive aggregates, the members of which are forbidden by an inexorable law to marry outside the group to which they belong.' On the other, Keith (1916) says, 'Without doubt many of the races found in India, Furthur India, and in Oceania have been produced by the blending of two or more distinct human stocks.' Similarly it has been recorded (quoted by Crook 1914) that according to Ethnographical Survey of India, 1906, 'The Burmese is the most mixed race in the province.' The other causes such as trading, which are traceable at the present day, contribute to the same result.

The origins of these South Asian peoples as a whole have not been determined historically due to a constant influx of various types of civilization. India, especially the Northern plains and the Deccans, has been the scene of constant war and rapine

except for short periods notably those of Asoka (267 B.C. - 230 B.C.), Harsha (606 A.D. - 646 A.D.), the early Mughals (1483 A.D. - 1605 A.D.), the British Supremacy (1858 - 1947). During these ages of unrest there must have been dispersion of the population, intermingling of racial types helped by slave driving which was a normal condition of existence.

The earlier attempts to discover the relationships of 'the race' have been based almost entirely on philological evidence and the most fantastic and often diametrically opposed theories brought forward by different writers.

Hence the study of South Asian Crania is undertaken in an attempt to reveal by means of their cranial characteristics the different groups of the people inhabiting these regions.

A survey of the literature concerned with the anthropological contribution to the South Asian crania reveals that very little comprehensive work has been carried out. The earlier study has been based either on purely metrical or largely on non-metrical methods.

Anthropologists have in the past taken one or other of two opposed views on the relative value of metrical and non-metrical methods. On the one hand, Wood Jones (1931) says, 'It is the constant

despair of the physical anthropologist that neither absolute measurements nor even indices, no matter how cunningly contrived, can give a satisfactory concrete picture of the form of the cranium or any part of it.' However, Morant (1939) remarks that the metrical method has the added advantage of permitting the systematic reduction of data for making comparisons.

On the other hand, study by the non-metrical method alone is also unsatisfactory as Wood Jones (1931) has pointed out, 'Of the characters that are incapable of precise measurement all are not alike, for some are capable of reference to conventional standards and some are not. Even the accepted conventions of verbal estimation are far from satisfactory in their actual application.' Hooton (1926) has remarked about the conventional standards, 'They are capable of classification according to presence or absence, grade of development and form, if the observer is experienced and is able to maintain a constant standard for his morphological appraisals.' Wood Jones (1931) says, 'Such (non-metrical) descriptions are nearly always unsatisfactory, their utility being almost entirely confined to their employment as working notes by their original author.' He, however, goes on to remark, 'It is only by further work in

this direction that we may arrive at what might be termed a sufficient descriptive catalogue of non-metrical cranial morphological features, which combined with the graphic reconstruction methods, may be expected to yield a concrete picture of the essential characters of any racial type of skull.' Morant (1939) points out that it would be difficult to devise effective ways of expressing some of the features metrically. He, however, goes on to say, 'Unfortunately it is quite impossible to reconcile some of the general conclusions reached by statistical means with conclusions of certain kinds regarding the relationship put forward by those who rely almost entirely on anatomical comparisons.' He attributes this to the difficulty of standardizing non-metrical features. However, he also holds out hope that anthropologists will 'speak with one voice' in the future.

The study by metrical or non-metrical methods is of value for the determination of local racial characteristics, but the anthropologists are faced with the problem of mixed races. Morant (1923) also expresses this view, and says, 'The general tendency of anthropologists nowadays is to lay smaller stress on the value of local races and to seek for fundamental human types which may

be mingled or hybridised in local races.'

Recently an approach which incorporates the systematic use of both metrical and non-metrical methods of study has been expanded by Angel (1944). He says, 'It is my hypothesis that really useful and dynamic description of such small samples as are available . . . . . is possible only through the use of morphological types chosen from the total series . . . . . .' Hence all the crania irrespective of geographical or ethnographical basis has been pooled together and analysed metrically and non-metrically on this basis. They are divided into groups according to Angel's morphological types.

As used by Angel, the method is designed to follow the interplay of different types through successive periods in a limited area. This study is an attempt to apply the same approach to the rather different situation presented by the South Asian Crania available for study. Here the populations are not succeeding one another in time, but occupy contiguous regions within a large area. Angel's methods have been adopted throughout in pursuing this study except for certain characters which have been omitted and a few which have been added to make the study more comprehensive. Where this has been done mention of it is made in the text.

Material and method of selection.

The collection of mature male crania which form the subject of the present study is made available in the Anatomical Museum at Edinburgh University. An effort is made to make as representative as possible in order to cover the whole of South Asia as well as neighbouring South East Asia (Burma - Borneo) and China (Tibet and South China).

A total of 241 crania are chosen out of 471 representing these regions. The other small series of 19 Naga, 5 Veddah, 4 Sakai, 4 Tibetan and 4 South Indian crania are studied separately. They cannot be pooled together with the total selected crania due to inadequate representation of each of these series, the peculiar geographical origin, and certain peculiarities (p.98).

The selection of the material is made keeping two purposes in view. One is to select only those crania which are free from damage likely to hamper the metrical and non-metrical observations. The other is to select only mature male crania so as to keep the series uniform as far as possible throughout the study.

The determination of age and sex is carefully carried out in every case making use of the usual criteria (Turner 1884 - 1886) and Morant (1922 - 1923).

Sexing of Crania.

For this the criteria laid down by Turner (1884 - 1886) are followed. He says, 'In determining the sex, I have relied on the comparison of skulls of each race on the greater size, weight and capacity, on the projection of the glabella, superciliary ridges, mastoid process, inion and superior curved occipital line and on a more backward slope of the frontal region as characteristic of the male skulls. Whilst a more feeble development of the ridges and the projections which mark the position of air sinuses and the attachment of the muscles, smaller size and capacity, a fuller occipital squama as compared with the inion and curved line; a more vertical forehead, a greater flattening of the vertex and consequently a diminished height of the skull with frequently, though not invariably, a greater breadth of the cranium in the region of the parietal eminences than near the squamous sutures have to be regarded as characteristic of the female skull.'

The crania known to originate from Bengal are peculiar in that they are smaller and lighter than the remainder of the South Asian series and cannot easily be sexed. However, the same criteria, which have proved satisfactory with the other South Asian crania where the sex difference are much more clearly marked with regard to the sexing

of the crania, are applicable to the Bengali series when compared among themselves. This is in agreement with Keen (1950) who states, 'The problem may be comparatively easy, provided something is known of the differential sexual characteristics in that particular human group.'

Finally the sexing has been checked by Dr Wells, and from the documentary evidence on sex available from the cranial catalogue.

Age of the Crania.

The criteria laid down by Turner (1884 - 1886) and later by Morant (1922 - 1923) are followed. Turner says, 'When the teeth were all erupted except one or two of the wisdom, and either slightly or moderately worn, and the sutures unossified or only partially obliterated, the skull is called Adult.' Morant says, 'The skull is adult with the sutures joined but not obliterated, basilar synchondrosis noted, also any teeth in the process of coming through or lost during life and consequent absorption of alveolus falling in or thinning of calvaria due to old age looked for . . . . . '

There is little of special note to record with regard to the age of the crania as experience during the course of investigation has shown that the age can be determined in all cases without difficulty.

Segregation of Primary types.

The cranial material available for study has already been used by a number of different authors (Harrower 1926, 1928 and Turner 1899 - 1913). These previous workers have dealt with their material as constituting local or ethnographic groups, mostly too small in number to permit statistical analysis. The present study has been an exploration of the possibilities of a different line of approach as stated above, that is, to pool the material available over a large area and subdivide it morphologically without reference to geographic or ethnographic groupings.

Initially it was intended to confine the study to the material from India (including Ceylon and East Pakistan). However, on including the crania available from North Eastern periphery of this area, types appeared which were alien to peninsular India but cognate to either South East Asia or South China. To take account of these North East Indian crania it was decided to extend the study by taking in the areas of South East Asia and South China.

The first result of this analysis is to reveal that each of these three larger regions (India with Ceylon, South East Asia and South China) displayed a recognisable homogeneity of

type most clearly registered by the norma facialis of the cranium Plate No. 5, 6, 7 and 8 Vol. 11. This primary grouping is thus esentially equivalent to that arrived at on quite other grounds by Woo and Morant (1932). The distinctive facial characters of the three regional types are as follows:-

Indian region (Plate No. 6 and 7):

The long axis of the cheek bones as seen in norma facialis, that is essentially in the line of the orbital processes are disposed vertically, or may even appear to converge downwards. The face thus presents an appearance of narrowness which is independent of the actual relation of height and breadth by measurement. Furthermore, in the vast majority of these crania the interorbital region appears narrow and the nasal bridge strongly arched and prominent.

South East Asian region (Plate No. 5):

The face appears remarkably wide, owing to a very pronounced outward flare of the cheek bones, and although the interorbital region is broad, the nasal bridge is distinctly arched.

South Chinese region (Plate No. 8):

The face gives the impression of being elongated. This is due very largely to a downward development of the maxilla below the lower border of the zygomatic arches, as a result of the cheek bones, even though wide and flaring, do not dominate the form of the face as in the preceding groups. The interorbital region is broad and the nasal bridge almost completely flat.

Definition of Morphological types:

The process of placing the various specimens into groups has been carried out by direct comparison since all the crania are simultaneously available and it is not necessary to have recourse to photographs such as Angel (1944) used in his study.

The only method of type selection available for use within each of the above groups is to take as a basis for comparison a small number of crania varying from two to four all showing the same or similar morphological characters. All the remaining crania are then scrutinized for similar types which are then grouped with those first selected. From the remainder another small group of crania of very similar appearance to each other but disimilar from the first group is selected, and the whole process

repeated. This is done until the whole series is divided into groups of similar crania. This makes it possible for a simultaneous comparison of all normae of each cranium with the others. Easy assembly of the cranium into groups can be obtained by bringing together those that appear most nearly identical with one of the standard crania. The sorting and grouping together of these crania is repeated frequently at intervals of several days to prevent the eye getting accustomed to particular features.

This method has produced seven such groups and repeated checking does not appreciably alter the placing of individual skulls within the various groups.

On the basis of this analysis it has been found possible to recognize three types (provisionally labelled I 1, I 11 and I 111) within the Indian area, two types (B1 and B11) in the South East Asian area, and two types (C1 and C11) in the Chinese area. The salient features of these different types are as follows:-

South East Asian Type B1 (Plate No. 9):

Vault moderately long, high in relation to length and breadth, occiput evenly rounded.

South East Asian Type B11 (Plate No. 9):

Vault short and wide, high in relation to length but not to breadth, occiput almost flat and vertical.

Indian Type I 1 (Plate No. 10):

Vault moderately long, high in relation to length but not to breadth. Occiput evenly rounded. Forehead inclined and somewhat receding.

Indian Type I 11 (Plate No. 11):

Vault long, high in relation to breadth but not to length, occiput rounded or slightly protruding. Forehead rounded and receding.

Indian Type I 111 (Plate No. 10):

Vault long, high in relation to breadth but not to length, relatively flat on top, occiput protruding. Forehead vertical.

Chinese Type C1 (Plate No. 12):

Vault short, high in relation to length but not to breadth, moderately flat on top, occiput slightly rounded and almost vertical.

Chinese Type C11 (Plate No. 12):

Vault moderately long, high in relation to length and breadth, occiput protruding with distinct lambdoid flattening.

The type distribution of the individual crania of South Asian series with their geographical position is given in Table 1 and shown in Maps Plate No. 1 and 2 in vol. 11.

TABLE I

Catalogue No.	No. of skulls	Geographical area	Total no. of skulls	Types
XXIL	1	Shan states		
XXIIA	2	Siam (Thailand)		
XXIIF	10	Borneo	33	B1
XXIIC	6	Malay Peninsula		
XXIK	14	Burma		
XXIIA	4	Siam (Thailand)		
XXIIC	1	Malay Peninsula	22	B11
XXIK	17	Burma		
XXIA	2	East Bengal		
XXXVL	2	East Pakistan		
XXID	13	South India	24	I 1
XXIG	1	Ceylon		
XXIJ	6	India & Pakistan		
XXIA	2	West & East India & Pakistan		
XXXVL	5	West Bengal		
XXIB	1	Madhya Bharat(India)	28	I 11
XXID	15	South India		
XXIG	5	Ceylon		
XXIA	12	West & East India & Pakistan		
XXIB	3	Madhya Bharat(India)		
XXID	17	South India	50	I 111
XXIG	4	Ceylon		
XXIJ	14	India & Pakistan		
XXIVB	51	China (Southern)	51	C1
XXIVB	33	China (Southern)	33	C11

It may be objected against this procedure that its effect is simply to isolate the two extremes of a single normally distributed population. If this was the case, however, there would inevitably be a large central block of crania which could not readily be assigned to one or other type. In practice this has not been found to be the case. The number of crania whose position in the grouping was uncertain never exceeded 10% for any pair of groups.

Measurement of South Asian Cranial Types.

The craniometrical work to be of value must follow some accepted scheme as far as possible. Trevor (1950) points out, 'Despite the existence of international concordats on anthropometric procedure there is still a regrettable divergence in practice among different observers which has vitiated the comparability of a formidable proportion of their results.' And to substantiate his remarks he says, 'In view of the question as it affects methods adopted to measure the living, Mahalanobis estimates that, 'fully from 55% to 70% of the usefulness of the material is wasted owing to lack of agreement in definition and technique.'

Hence in this present study the terms, fixed bony points and cranio-metrical procedures mentioned by Trevor (1950) have been adopted.

The measurements have been made with instruments graduated in millimeters, and have been read in every case to the nearest whole millimeter. From these measurements, the following statistical ~~parameters~~ data have been calculated.

1. Arithmetic mean of each measurement for each series.
2. Standard deviation of each measurement.
3. Weighted mean standard deviation of each measurement.
4. Standard error of mean of each measurement for each series calculated from weighted mean standard deviation.

Method of calculation:

'The estimated S.D. (standard deviation) may be defined as $\sqrt{\{\Sigma(x-\bar{x})^2/(n-1)\}}$ where $\bar{x}$ is the arithmetic mean of a sample and $x-\bar{x}$ the deviation of n observations from it.' (Trevor 1947).

The standarddeviation, which is the measure of the variability of the series, is the basis of all further statistical analysis. It is therefore essential that we should be able to accept this measure as valid. But in practice it is very doubtful whether the standard deviation determined from a small sample is a true measure of variability. Howells (1936) indeed asserts that the standard deviation cannot be relied upon if the sample consists of less than fifty specimens.

Several methods for overcoming this difficulty have been proposed. Pearson and his co-workers have advocated taking the standard deviation

determined from a single very large series as applicable to all. Howells (1936) has suggested that the mean for the standard deviation of several large series should be used as a standard with which to compare those obtained from the samples under discussion. A slightly different method suggested by Trevor (1947) is the calculation of a weighted mean standard deviation for the several samples discussed. He says, '..... to use the mean weighted value of the various standard deviations of each character to find the standard errors of the respective means, these irrelevant differences will be ironed out.' This procedure assumes that the inaccuracies of the individual standard deviations will tend to cancel one another out.

In Table III the weighted mean standard deviations of the present South Asian series are compared with those of series which have been taken as standard by Pearson and his co-workers. Wherever comparison is possible, it will be seen that the weighted mean standard deviations of the present series are of the same order of magnitude as those of the 'standard' series; except in a few instances they are larger but in none appreciably smaller. By this criterion it appears that the weighted mean standard deviation is a reasonable measure of variability. It seems more logical therefore, to follow Trevor's procedure and derive the standard error for the means of the present South Asian cranial series from the weighted

mean standard deviation.

The next step is the calculation of weighted mean of standard deviation which is calculated by multiplying standard deviation of each character with its respective 'degree of freedom' $n - 1$, then dividing the sum of the product by total number of degrees of freedom.

Standard error of Mean:

To obtain the standard error of the mean, the standard deviation (in this study the weighted mean standard deviation) is divided by the square root of the number of observations comprising the series ($\sqrt{n}$).

Standard error of difference of means:

The significance of the difference (D) between the means for the same measurement in different series is determined by the ratio which it bears to the standard error of the difference (ED). This is calculated by the formula $SE_1^2 + SE_2^2$ where SE_1 and SE_2 are the standard errors of the means to be compared. The ratio D/ED has been termed the 'Critical Ratio'.

For the difference to be considered statistically significant, the 'critical ratio' must exceed a certain value. There is, however, some divergence of practice among recent writers as to the level at which this value should be set. Keen

(1947) says, 'According to the laws of probability the significance of the numerical values obtained for the critical ratio is as follows. If the critical ratio is 2.5, a difference between the two means equal to or greater than the observed difference is not likely to be found in more than 6 out of 1000 comparisons of groups drawn from similar population groups. Hence, we are justified in concluding that the observed difference is almost certainly due to systematic and not to chance factors; in other words that the observed difference is significant. Such a conclusion is all the more justified if the critical ratio exceeds 2.5, the significance becoming more and more important as the critical ratio increases.'

Trevor (1947) regards as significant all the critical ratios of 2.0 or more; at this level such a difference would arise by chance about once in twenty times. Nevertheless he ~~draws a distinction between~~ differentiates those cases in which it exceeds 2.5. Steffensen (1953) takes all values of the critical ratio in excess of 2.0 to be significant without further differentiation. In this study those differences which are significant at a critical ratio of 2.5 are differentiated from those which are significant at a critical ratio of 2.0 only.

TABLE II.

Estimated Standard Deviation of Male South Asian Cranial Series.

Character	Burmese Type I	Burmese Type II	Indian Type I	Indian Type II	Indian Type III	Chinese Type I	Chinese Type II	Weighted Mean Standard Devn.
H.C.	14.69(33)	13.54(22)	18.70(24)	10.72(28)	10.66(50)	13.45(51)	14.20(33)	13.36(234)
S.A.	14.87(33)	16.47(22)	13.66(24)	12.58(28)	11.98(50)	13.65(51)	13.72(33)	13.61(234)
F.A.	6.30(33)	5.20(22)	4.79(24)	5.96(28)	6.04(50)	5.91(51)	6.19(33)	5.86(234)
P.A.	9.55(33)	7.42(22)	11.36(24)	7.35(28)	7.39(50)	9.90(51)	6.09(33)	8.43(234)
O.A.	9.54(33)	7.90(22)	7.95(24)	7.99(28)	7.81(50)	7.31(51)	10.61(33)	8.37(234)
T.A.	12.38(33)	9.79(22)	11.99(24)	9.46(28)	12.37(50)	12.76(51)	11.46(33)	11.73(234)
C.L.	4.74(33)	6.51(22)	5.87(24)	4.96(28)	6.26(50)	6.41(51)	6.33(33)	5.93(234)
C.B.	6.35(33)	4.69(22)	6.96(24)	4.55(28)	5.48(50)	6.43(51)	5.67(33)	5.80(234)
B.B.H.	5.48(33)	3.94(22)	4.52(24)	6.13(28)	6.16(50)	5.92(51)	4.83(33)	5.47(234)
B.N.L.	6.19(33)	4.79(22)	4.39(24)	5.57(28)	4.98(50)	4.59(51)	4.10(33)	4.93(234)
B.B.	5.28(32)	4.63(22)	4.19(24)	5.51(28)	4.67(47)	4.94(51)	4.30(33)	4.72(230)
M.F.B.	4.01(33)	4.45(22)	4.29(24)	4.62(28)	3.80(50)	4.31(51)	4.28(33)	4.20(234)
F.C.	4.13(33)	3.95(22)	3.76(24)	5.04(28)	5.28(50)	4.79(51)	4.91(33)	4.67(234)
P.C.	7.14(33)	6.94(22)	8.78(24)	5.85(28)	5.33(50)	7.65(51)	4.52(33)	6.51(234)
O.C.	7.60(33)	5.71(22)	7.06(24)	5.52(28)	5.29(50)	5.73(51)	6.64(33)	6.12(234)
B.P.L.	5.42(33)	5.84(22)	5.98(24)	4.66(28)	4.64(50)	5.10(51)	4.50(33)	5.07(234)
F.M.L.	2.49(31)	3.14(22)	2.33(24)	3.14(28)	2.67(48)	2.21(51)	2.49(33)	2.59(230)
F.M.B.	2.00(31)	2.25(22)	2.00(24)	2.45(28)	3.23(48)	1.92(51)	1.77(33)	2.28(230)
B.	5.55(32)	6.80(22)	6.15(24)	4.74(28)	3.68(50)	4.42(51)	4.56(33)	4.86(233)
U.F.H.	5.18(33)	4.52(22)	4.61(24)	3.35(28)	4.02(50)	4.90(51)	5.84(33)	4.64(234)

Character	Burmese Type I	Burmese Type II	Indian Type I	Indian Type II	Indian Type III	Chinese Type I	Chinese Type II	Weighted mean Standard Devn.
N.H.	2.70(33)	3.18(22)	2.80(24)	2.51(28)	3.10(50)	3.12(51)	3.00(33)	2.95(234)
N.B.	2.22(33)	1.94(22)	1.37(24)	2.16(28)	1.94(50)	2.18(51)	2.01(33)	2.01(234)
L.O.H.	1.98(33)	2.16(22)	2.39(24)	2.05(28)	2.10(50)	2.40(51)	2.11(33)	2.18(234)
L.O.B.	1.43(33)	1.51(22)	1.90(24)	1.66(28)	1.71(48)	1.41(51)	1.97(33)	1.64(232)
Biorb.	3.18(32)	3.55(22)	3.81(23)	2.84(28)	2.82(50)	4.33(51)	3.29(33)	3.42(232)
E. Biorb.	3.80(32)	3.63(22)	3.87(24)	2.94(28)	3.15(50)	5.60(51)	3.21(33)	3.86(233)
C.I.	3.62(33)	3.65(22)	4.06(24)	2.57(28)	3.96(50)	4.81(51)	3.07(33)	3.80(234)
L.H.I.	2.91(33)	2.48(22)	2.88(24)	3.02(28)	3.94(50)	3.22(51)	2.69(33)	3.13(234)
B.H.I.	3.97(33)	3.85(22)	5.61(24)	4.35(28)	4.84(50)	5.46(51)	4.53(33)	4.74(234)
F.P.I.	2.64(32)	4.02(22)	3.07(24)	3.62(28)	2.54(47)	2.73(51)	3.17(33)	3.00(230)
C.F.I.	4.92(32)	4.22(22)	4.84(24)	4.37(28)	4.49(47)	3.54(51)	4.11(33)	4.28(230)
U.F.I.	3.05(32)	3.18(22)	6.43(24)	2.97(28)	3.30(47)	3.18(51)	4.17(33)	3.62(230)
N.I.	4.49(33)	2.97(22)	3.01(24)	4.78(28)	5.05(50)	4.45(51)	3.05(33)	4.15(234)
L.O.I.	5.30(33)	6.53(22)	6.57(24)	4.79(28)	6.16(48)	5.69(51)	5.67(33)	5.79(234)

TABLE III.

Weighted Mean Standard Deviation of South Asian Cranial Series compared with Standard Deviations of Egyptian and English Series (Pearson and Davin 1924).

Character	Egtyptian XXVI-XXX Dynasties	Prehistoric, Naqada	17th Century English	Range	South Asian Cranial Series
H.C.	13.77	13.00	15.02	13.00-15.02	13.36
S.A.	12.51	11.91	13.69	11.91-13.69	13.61
F.A.	6.22	-	5.55	5.55- 6.22	5.86
P.A.	7.42	-	7.61	7.42- 7.61	8.43
O.A.	6.81	-	8.48	6.81- 8.48	8.37
T.A.	9.89	-	11.40	9.89-11.40	11.73
C.L.	5.72	5.99	6.27	5.72- 5.99	5.93
C.B.	4.76	4.60	5.28	4.76- 5.28	5.80
B.B.H.	5.03	5.38	5.56	5.03- 5.56	5.47
B.N.L.	3.97	4.85	4.13	4.13- 4.97	4.93
B.B.	4.57	5.22	5.57	4.57- 5.57	4.72
M.F.B.	4.05	4.82	4.20	4.05- 4.82	4.20
O.C.	4.81	-	5.94	4.81- 5.94	6.12
B.P.L.	4.85	4.58	4.49	4.49- 4.85	5.07
F.M.L.	2.47	-	2.86	2.47- 2.86	2.59
F.M.B.	2.15	-	1.82	1.82- 2.15	2.28
B.	4.67	4.97	5.07	4.67- 5.07	4.86
U.F.H.	4.15	4.11	3.86	3.86- 4.15	4.64

Character	Egyptian XXVI-XXX Dynasties	Prehistoric, Naqada	17th Century English	Range	South Asian Cranial Series
N.H.	2.92	3.00	2.60	2.60-3.00	2.95
N.B.	1.77	1.98	2.16	1.77-2.16	2.01
L.O.H.	1.88	2.31	1.88	1.88-2.31	2.18
L.O.B.	1.65	2.14	1.81	1.65-2.14	1.64
C.I.	2.68	2.80	3.26	2.68-3.26	3.80
L.H.I.	2.94	2.73	3.22	2.73-3.22	3.13
B.H.I.	4.30	4.53	5.14	4.30-5.14	4.74
U.F.I.	4.96	4.52	5.39	4.52-5.39	3.62
N.I.	3.82	4.18	4.58	3.82-4.58	4.15
L.O.I.	4.95	5.06	3.78	3.78-5.06	5.79

TABLE IVI.

Means and Standard Error of Male South-Asian Cranial Series.

Character	Burmese Type 1	Burmese Type 11	Indian Type 1	Indian Type 11	Indian Type 111	Chinese Type 1	Chinese Type 11
H.C.	503.73±2.325	493.32±2.847	488.34±2.726	496.60±2.524	490.60±1.889	501.63±1.870	509.30±2.325
S.A.	363.97±2.369	353.91±2.901	358.18±2.778	366.75±2.571	361.80±1.924	359.49±1.905	374.85±2.369
F.A.	126.o ±1.020	124.32±1.249	125.63±1.196	128.46±1.107	125.58±0.828	125.88±0.820	125.70±1.020
P.A.	125.10±1.468	121.95±1.798	126.88±1.721	128.43±1.593	124.20±1.192	122.14±1.181	129.45±1.468
O.A.	113.58±1.456	107.24±1.783	106.75±1.707	110.50±1.581	111.80±1.183	111.41±1.171	120.82±1.456
T.A.	320.80±2.041	323.14±2.500	316.o ±2.393	309.54±2.216	306.60±1.658	329.61±1.672	322.18±2.041
C.L.	177.04±1.032	168.64±1.264	173.67±1.210	180.54±1.120	177.14±0.838	168.98±0.830	179.97±1.032
C.B.	134.52±1.009	137.91±1.236	132.87±1.183	128.00±1.095	128.94±0.820	143.04±0.811	137.00±1.009
B.B.H.	134.76±0.952	133.77±1.166	133.83±1.116	133.97±1.034	131.56±0.773	135.29±0.766	136.36±0.952
B.N.L.	97.04±0.859	96.91±1.052	98.54±1.007	99.89±0.952	98.70±0.700	95.49±0.691	97.03±0.859
B.B.	132.03±0.835	133.32±1.007	127.29±0.964	124.54±0.893	123.85±0.689	133.39±0.662	131.58±0.822
M.F.B.	93.21±0.732	92.09±0.896	94.00±0.858	93.89±0.794	91.12±0.595	91.02±0.589	90.85±0.732
F.C.	109.27±0.812	108.59±0.996	109.38±0.953	111.00±0.883	108.06±0.660	110.45±0.654	109.58±0.812
P.C.	109.88±1.132	106.41±1.387	110.17±1.330	114.07±1.229	111.24±0.920	106.33±0.911	113.88±1.132
O.C.	95.15±1.065	91.14±1.305	90.17±1.249	91.64±1.156	92.68±0.865	95.27±0.857	98.82±1.065
B.P.L.	94.61±0.882	93.59±1.080	92.50±1.034	95.18±0.957	91.86±0.716	91.22±0.709	91.67±0.882

F.M.L.	36.10±0.467	35.36±0.551	35.29±0.527	34.64±0.488	34.52±0.373	35.71±0.361	35.21±0.449
F.M.B.	28.45±0.408	28.07±0.485	28.21±0.464	27.14±0.430	28.36±0.323	28.24±0.318	28.00±0.396
B.	98.69±0.858	99.46±1.035	95.88±0.991	92.36±0.917	92.08±0.686	98.51±0.679	98.18±0.845
U.F.H.	68.09±0.807	69.55±0.989	68.08±0.947	65.36±0.877	64.38±0.656	71.04±0.649	70.82±0.807
N.H.	51.73±0.512	51.64±0.627	49.79±0.601	49.25±0.556	48.42±0.416	52.20±0.412	51.94±0.512
N.B.	25.21±0.349	25.05±0.428	23.17±0.409	24.18±0.379	23.76±0.283	23.94±0.281	24.33±0.349
L.O.H.	32.39±0.378	32.86±0.464	31.96±0.444	31.00±0.411	30.82±0.307	32.92±0.304	33.33±0.378
L.O.B.	39.21±0.284	39.45±0.349	39.83±0.334	39.22±0.309	38.86±0.236	38.26±0.229	38.36±0.284
B.Br.	95.90±0.604	96.23±0.729	95.35±0.713	95.82±0.646	94.83±0.483	94.35±0.478	94.84±0.595
E.B.	103.31±0.682	104.09±0.822	101.96±0.787	102.29±0.729	100.98±0.545	102.29±0.540	102.46±0.671
C.I.	75.55±0.660	81.46±0.809	75.83±0.775	70.50±0.717	72.44±0.537	84.20±0.531	76.03±0.661
L.H.I.	75.67±0.545	78.91±0.668	76.71±0.640	73.82±0.592	73.9 ± 0.443	79.98±0.756	75.67±0.545
B.H.I.	99.79±0.825	96.64±1.011	100.71±0.968	104.21±0.896	101.76±0.670	94.75±0.664	99.36±0.825
F.P.I.	70.16±0.530	68.55±0.639	73.54±0.612	75.00±0.566	72.69±0.437	67.80±0.420	68.58±0.522
C.F.I.	97.59±0.757	96.23±0.913	95.79±0.874	96.93±0.810	95.75±0.625	92.86±0.600	95.79±0.746
U.F.I.	51.06±0.641	51.68±0.773	51.46±0.740	52.00±0.685	51.55±0.529	52.81±0.507	53.39±0.631
N.I.	48.09±0.723	48.23±0.885	46.42±0.848	48.79±0.785	48.90±0.587	45.53±0.582	46.55±0.722
L.O.I.	82.21±1.007	83.05±1.234	79.92±1.181	78.46±1.094	79.00±0.835	85.35±0.810	86.52±1.007

Left Orbital Breadth is measured from the maxillofrontale (Trevor 1950) to ectonchion as defined by Martin (1928).

TABLE V.

Significant Differences between Means of Male South Asians with Error of Difference and Critical Ratio.

	B1 - B11		B1 - I 1		B1 - I 11		B1 - I 111		B1 - C1	
	Diff.and error of diff.	Crit. Ratio	Diff.and error of diff.	Crit. Ratio	Diff.and error of diff.	Crit. Ratio	Diff.and error of diff.	Crit. Ratio	Diff.and error of diff.	Crit. Ratio
H.C.	10.41±3.676	2.83	15.39±3.583	4.30	7.13±3.432	2.08	13.13±2.995	4.38	2.10±2.984	0.70
S.A.	10.06±3.746	2.69	5.79±3.651	1.59	-2.78±3.496	0.80	2.17±3.052	0.71	4.48±3.040	1.47
F.A.	1.68±1.613	1.04	0.37±1.572	0.24	-2.46±1.505	1.63	0.42±1.314	0.32	0.12±1.309	0.09
P.A.	3.15±2.321	1.36	-1.78±2.262	0.79	-3.33±2.166	1.54	0.90±1.891	0.48	2.96±1.884	1.57
O.A.	6.34±2.302	2.75	6.83±2.244	3.04	3.08±2.138	1.44	1.78±2.126	0.84	2.17±1.869	1.16
T.A.	-2.34±3.228	0.72	4.80±3.145	1.53	11.26±3.013	3.74	14.20±2.630	5.40	-8.81±2.620	3.36
C.L.	8.40±1.632	5.15	3.37±1.590	2.12	-3.50±1.523	2.30	-0.10±1.329	0.08	8.06±1.324	6.09
C.B.	-3.39±1.596	2.12	1.65±1.555	1.06	6.52±1.489	4.38	5.58±1.300	4.29	-8.52±1.295	6.58
B.B.H.	0.99±1.505	0.66	0.93±1.467	0.63	0.79±1.405	0.56	3.20±1.226	2.61	-0.53±1.222	0.43
B.N.L.	0.13±1.358	0.10	-1.50±1.324	1.13	-2.85±1.282	2.22	-1.66±1.108	1.50	1.55±1.103	1.41
B.B.	-1.29±1.309	0.99	4.74±1.275	3.72	7.49±1.222	6.13	8.18±1.083	7.55	-1.36±1.065	1.28
M.F.B.	1.12±1.157	0.97	-0.79±1.128	0.70	-0.68±1.080	0.63	2.09±0.889	2.35	2.19±0.940	2.32
F.C.	0.68±1.285	0.53	-0.11±1.252	0.90	-1.73±1.199	1.44	1.21±1.046	1.16	-1.18±1.043	1.13
P.C.	3.47±1.790	1.94	-0.29±1.747	0.17	-4.19±1.671	2.51	-1.36±1.459	0.93	3.55±1.453	2.44

	B1 - B11		B1 - I 1		B1 - I 11		B1 - I 111		B1 - C1	
	Diff.and error of diff.	Crit. Ratio	Diff.and error of diff.	Crit. Ratio	Diff. and error of diff.	Crit. Ratio	Diff.and error of diff.	Crit. Ratio	Diff.and error of diff.	Crit Ratio
O.C.	4.01±1.685	2.38	4,98±1.641	3.03	3.51±1.572	2.23	2.47±1.372	1.80	-0.12±1.367	0.09
B.P.L.	1.02±1.395	0.73	2.11±1.356	1.56	-0.57±1.321	0.43	2.75±1.136	2.42	3.39±1.132	2.99
F.M.L.	0.74±0.720	1.03	0.81±0.702	1.15	1.46±0.673	2.17	1.58±0.595	2.66	0.39±0.587	0.66
F.M.B.	0.38±0.633	0.60	0.24±0.617	0.39	1.31±0.592	2.21	0.09±0.520	0.17	0.21±0.517	0.41
B.	-0.77±1.344	0.57	2.81±1.311	2.14	6.33±1.256	5.04	6.61±1.099	6.01	0.18±1.094	0.16
U.F.H.	-1.46±1.276	1.14	0.01±1.244	0.008	2.73±1.192	2.29	3.71±1.040	3.57	-2.95±1.035	2.85
N.H.	0.09±0.810	0.111	1.94±0.789	2.46	2.48±0.756	3.28	3.31±0.660	5.02	-0.47±0.657	0.72
N.B.	0.16±0.552	0.29	2.04±0.538	3.79	1.03±0.516	2.00	1.45±0.449	3.23	1.27±0.448	2.83
L.O.H.	-0.47±0.598	0.79	0.43±0.583	0.74	1.39±0.559	2.49	1.57±0.487	3.22	-0.53±0.485	1.09
L.O.B.	-0.24±0.451	0.53	-0.62±0.439	1.41	-0.01±0.421	0.02	0.35±0.370	0.95	0.95±0.365	2.60
B.Br.	-0.33±0.947	0.35	0.55±0.934	0.59	0.08±0.884	0.09	1.07±0.773	1.38	1.55±0.770	2.01
E.B.	-0.78±1.068	0.73	1.35±1.041	1.30	1.02±0.998	1.02	2.33±0.873	2.67	1.02 0.870	1.17
C.I.	-5.91±1.045	5.66	-0.28±1.019	0.27	5.05±0.975	5.18	3.11±0.851	3.65	-8.65±0.848	10.20
L.H.I.	-3.24±1.472	2.20	-1.04±1.404	0.74	1.85±1.293	1.43	1.77±0.976	1.81	-4.31±1.693	2.55
B.H.I.	3.15±1.305	2.41	-0.92±1.272	0.72	-4.42±1.218	3.63	-1.97±1.063	1.85	5.04±1.059	4.76
F.P.I.	1.61±0.830	1.94	-3.38±0.810	4.17	-4.84±0.775	6.25	-2.53±0.687	3.68	2.36±0.676	3.49
C.F.I.	1.36±1.351	1.01	1.80±1.343	1.34	0.66±1.330	0.50	1.84±1.289	1.43	4.73±1.283	3.69
U.F.I.	-0.62±1.004	0.62	-0.40±0.979	0.41	-0.94±0.938	1.00	-0.49±0.831	0.59	-1.75±0.818	2.14
N.I.	-0.14±1.143	0.12	1.67±1.115	1.50	-0.70±1.067	0.66	-0.81±0.932	0.87	2.56±0.928	2.76
L.O.I.	-0.84±1.634	0.51	2.29±1.594	1.44	3.75±1.530	2.45	3.21±1.357	2.37	-3.14±1.342	2.34

	B1 - C11		B11 - I 1		B11 - I 11		B11 - I 111		B11 - C1	
	Diff.and error of diff.	Crit. Ratio	Diff.and error of diff.	Crit. Ratio	Diff.and error of diff.	Crit. Ratio	Diff.and error of diff.	Crit. Ratio	Diff.and error of diff.	Crit. Ratio
H.C.	-5.57±3.288	1.69	4.98±3.942	1.26	-3.28±3.805	0.86	2.72±3.416	0.80	-8.31±3.406	2.44
S.A.	-10.88±3.350	3.25	-4.27±4.016	1.06	-12.84±3.877	3.31	-7.89±3.481	2.27	-5.58±3.471	1.61
F.A.	0.30±1.442	0.21	-1.31±1.729	0.76	-4.14±1.669	2.48	-1.26±1.499	0.84	-1.56±1.494	1.04
P.A.	-4.35±2.076	2.09	-4.93±2.489	1.98	-6.48±2.402	2.70	-2.25±2.157	1.04	-0.19±2.151	0.09
O.A.	-7.24±2.062	3.51	0.49±2.469	0.20	-3.26±2.373	1.37	-4.56±2.140	2.13	-4.17±2.133	1.95
T.A.	-1.38±2.887	0.48	7.14±3.461	2.06	13.60±3.341	4.07	16.54±3.00	5.51	-6.47±3.154	2.05
C.L.	-2.93±1.460	2.01	-5.03±1.750	2.87	-11.90±1.689	7.05	-8.50±1.817	4.68	-0.34±1.512	0.22
C.B.	-2.48±1.428	1.74	5.04±1.711	2.95	9.91±1.651	6.00	8.97±1.483	6.05	-5.13±1.479	3.47
B.B.H.	-1.60±1.346	1.19	-0.06±1.614	0.04	-0.20±1.558	0.13	2.21±1.399	1.58	-1.52±1.395	1.09
B.N.L.	0.01±1.215	0.008	-1.63±1.457	1.12	-2.98±1.419	2.10	-1.79±1.264	1.42	1.42±1.259	1.13
B.B.	0.45±1.181	0.38	6.03±1.394	4.33	8.78±1.346	6.52	9.47±1.221	7.76	-0.07±1.206	0.06
M.F.B.	2.36±1.035	2.28	-1.91±1.241	1.54	-1.80±1.197	1.50	0.97±1.028	0.94	1.07±1.072	0.99
F.C.	-0.31±1.148	0.27	-0.79±1.378	0.57	-2.41±1.330	1.81	0.53±1.195	0.44	-1.86±1.192	1.56
P.C.	-4.00±1.601	2.50	-3.76±1.921	1.96	-7.66±1.853	4.13	-4.83±1.664	2.90	-0.08±1.659	0.05
O.C.	-3.67±1.506	2.44	0.97±1.807	0.54	-0.50±1.744	0.29	-1.54±1.566	0.98	-4.13±1.562	2.64
B.P.L.	2.94±1.247	2.36	1.09±1.493	0.73	-1.59±1.443	1.10	1.73±1.296	1.33	2.37±1.292	1.83
F.M.L.	0.89±0.646	1.38	0.07±0.763	0.09	0.72±0.736	0.98	0.84±0.666	1.26	-0.35±0.659	0.53
F.M.B.	0.45±0.568	0.79	-0.14±0.671	0.21	0.93±0.648	1.44	-0.29±0.582	0.50	-0.17±0.580	0.29
B.	0.51±1.204	0.42	3.58±1.433	2.50	7.10±1.383	5.13	7.38±1.242	5.94	0.95±1.238	0.77
U.F.H.	-2.73±1.149	2.38	1.47±1.369	1.07	4.19±1.322	3.17	5.17±1.187	4.36	-1.49±1.183	1.26

	BL - C11		B11 - I 1		B11 - I 11		B11 - I 111		B11 - C1	
	Diff.and error of diff.	Crit. Ratio	Diff.and error of diff.	Crit. Ratio	Diff.and error of diff.	Crit. Ratio	Diff.and error of diff.	Crit. Ratio	Diff.and error of diff.	Crit. Ratio
N.H.	-0.21±0.724	0.29	1.85±0.868	2.13	2.39±0.838	2.85	3.22±0.752	4.28	-0.56±0.750	0.75
N.B.	0.88±0.494	1.78	1.88±0.592	3.18	0.87±0.572	1.52	1.29±0.513	2.51	1.11±0.512	2.17
L.O.H.	-0.94±0.535	1.76	0.90±0.642	1.40	1.86±0.620	3.00	2.04±0.556	3.67	-0.06±0.554	0.11
L.O.B.	0.85±0.402	2.11	-0.38±0.484	0.79	0.23±0.467	0.49	0.59±0.422	1.40	1.19±0.417	2.85
B.Br.	1.05±0,848	1.24	0,88±1.019	0.86	0.41±0.974	0.42	1.40±0.874	1.60	1.88±0.871	2.16
E.B.	0.85±0.957	0.89	2.13±1.138	1.87	1.80±1.100	1.64	3.11±0.986	3.15	1.80±0.984	1.83
C.I.	-0.48±0.935	0.51	5.63±1.120	5.03	10.96±1.081	10.14	9.02±0.971	9.29	-2.74±0.967	2.83
L.H.I.	0 ±1.188	0	2.20±1.712	1.29	5.09±1.588	3.21	5.01±1.234	4.06	-1.07±2.028	0.53
B.H.I.	0.43±1.167	0.37	-4.07±1.400	2.91	-7.57±1.351	5.60	-5.12±1.213	4.22	1.89±1.210	1.56
F.P.I.	1.58±0.744	2.12	-4.99±0.885	5.64	-6.45±0.853	7.56	-4.14±0.774	5.35	0.75±0.764	0.98
C.F.I.	1.80±1.317	1.37	0.44±1.375	0.32	-0.70±1.362	0.51	0.48±1.322	0.36	3.37±1.316	2.56
U.F.I.	-2.33±0.899	2.59	0.22±1.071	0.21	-0.32±1.033	0.31	0.13±0.937	0.14	-1.13±0.925	1.22
N.I.	1.54±1.022	1.51	1.81±1.226	1.48	-0.56±1.183	0.47	-0.67±1.062	0.63	2.70±1.059	2.55
L.O.I.	-4.31±1.513	2.85	3.13±1.708	1.83	4.59±1.649	2.78	4.05±1.490	2.72	-2.30±1.476	1.56

	B11 - C11		I 1 - I 11		I 1 - I 111		I 1 - C1		I1 - C11	
	Diff.and error of diff.	Crit. Ratio	Diff.and error of diff.	Crit. Ratio	Diff.and error of diff.	Crit. Ratio	Diff.and error of diff.	Crit. Ratio	Diff.and error of diff.	Crit. Ratio
H.C.	-15.98±3.676	4.35	-8.26±3.715	2.22	-2.26±3.317	0.68	-13.29±3.06	4.02	-20.96±3.583	5.85
S.A.	-20.94±3.746	5.59	-8.57±3.785	2.26	-3.62±3.379	1.07	-1.31±3.369	0.39	-16.67±3.651	4.57
F.A.	-1.38±1.613	0.86	-2.83±1.630	1.74	0.05±1.455	0.03	-0.25±1.453	0.17	-0.07±1.572	0.04
P.A.	-7.50±2.321	3.23	-1.55±2.345	0.66	2.68±2.094	1.28	4.74±2.087	2.27	-2.57±2.262	1.14
O.A.	-13.58±2.302	5.90	-4.75±2.316	2.05	-5.05±2.053	2.46	-4.66±2.070	2.25	-14.07±2.244	6.27
T.A.	0.96±3.228	0.30	6.46±3.262	1.98	9.40±2.911	3.23	-13.61±2.900	4.69	-6.18±3.145	1.97
C.L.	-11.33±1.632	6.94	-6.87±1.649	4.16	-3.47±1.472	2.36	4.69±1.467	3.20	-6.30±1.590	3.96
C.B.	0.91±1.596	0.57	4.87±1.612	3.02	3.93±1.439	2.73	-10.17±1.434	7.09	-4.13±1.555	2.66
B.B.H.	-2.59±1.505	1.72	-0.14±1.522	0.09	2.27±1.358	1.67	-1.46 ±1.354	1.08	-2.53±1.467	1.72
B.N.L.	-0.12±1.358	0.09	-1.35±1.386	0.97	-0.16±1.227	0.13	3.05±1.222	2.50	1.51±1.324	1.14
B.B.	1.74±1.309	1.33	2.75±1.314	2.09	3.44±1.184	2.91	-6.10±1.169	5.22	-4.29±1.275	3.36
M.F.B.	1.24±1.157	1.07	0.11±1.169	0.09	2.88±0.995	2.89	2.98±1.041	2.86	3.15±1.128	2.79
F.C.	-0.99±1.285	0.77	-1.62±1.298	1.25	1.32±1.159	1.14	-1.07±1.156	0.93	-0.20±1.252	0.16
P.C.	-7.47±1.790	4.17	-3.90±1.811	2.15	-1.07±1.617	0.66	3.84±1.612	2.38	-3.71±1.747	2.12
O.C.	-7.68±1.685	4.56	-1.47±1.702	0.86	-2.51±1.519	1.65	-5.10±1.515	3.37	-8.65±1.641	5.27
B.P.L.	1.92±1.395	1.38	-2.68±1.406	1.91	0.64±1.255	0.51	1.28±1.251	1.02	0.83±1.356	0.61
F.M.L.	0.15±0.711	0.21	0.65±0.718	0.91	0.77±0.648	1.19	-0.42±0.639	0.66	0.08±0.693	0.12
F.M.B.	0.07±0.626	0.11	1.07±0.632	1.69	-0.15±0.565	0.27	-0.03±0.562	0.05	0.21±0.610	0.34
B.	1.28±1.336	0.96	3.52±1.350	2.61	3.80±1.206	3.15	-2.63±1.201	2.19	— 2.30±1.302	1.77
U.F.H.	-1.27±1.276	0.99	2.72±1.291	2.11	3.70±1.152	3.21	-2.96±1.148	2.58	— 2.74±1.244	2.20

	B11 - C11		I 1 - I 11		I 1 - I 111		I 1 - C1		I 1 - C11	
	Diff.and error of diff.	Crit. Ratio	Diff.and error of diff.	Crit. Ratio	Diff.and error of diff.	Crit. Ratio	Diff.and error of diff.	Crit. Ratio	Diff.and error of diff.	Crit. Ratio
N.H.	-0.30±0.809	0.37	0.54±0.819	0.66	1.37±0.731	1.87	-2.41±0.729	3.31	-2.15±0.789	2.72
N.B.	0.72±0.552	1.30	-1.01±0.558	1.81	-0.59±0.497	1.19	-0.77±0.496	1.55	-1.16±0.538	2.16
L.O.H.	-0.47±0.598	0.79	0.96±0.605	1.59	1.14±0.539	2.12	-0.96±0.538	1.78	-1.37±0.583	2.35
L.O.B.	1.09±0.451	2.42	0.61±0.456	1.34	0.97±0.410	2.37	1.57±0.405	3.88	1.47±0.439	3.35
B.Br.	1.38±0.941	1.47	-0.47±0.962	0.49	0.52±0.861	0.60	1.00±0.858	1.17	0.50±0.928	0.54
E.B.	1.63±1.061	1.54	-0.33±1.067	0.31	0.98±0.957	1.02	-0.33±0.954	0.35	-0.50±1.034	0.48
C.I.	5.43±1.045	5.20	5.33±1.056	5.05	3.39±0.943	3.59	-8.37±0.940	8.90	-0.20±1.019	0.20
L.H.I.	3.24±1.472	2.20	2.89±1.518	1.90	2.81±1.173	2.40	-3.27±1.948	1.68	1.04±1.404	0.74
B.H.I.	-2.72±1.305	2.08	-3.50±1.319	2.65	-1.05±1.177	0.89	5.96±1.174	5.08	1.35±1.272	1.06
F.P.I.	-0.03±0.825	0.04	-1.46±0.834	1.75	0.85±0.752	1.13	5.74±0.742	7.74	4.96±0.804	6.17
C.F.I.	0.44±1.349	0.33	-1.14±1.355	0.84	0.04±1.315	0.03	2.93±1.308	2.24	0 ±1.341	0
U.F.I.	-1.71±0.998	1.71	-0.54±1.008	0.54	-0.09±0.910	0.09	-1.35±0.898	1.503	-1.93±0.973	1.98
N.I.	1.68±1.142	1.46	-2.37±1.156	2.05	-2.48±1.032	2.40	0.89±1.029	0.86	-0.13±1.114	0.12
L.O.I.	-3.47±1.634	2.12	1.46±1.610	0.91	0.92±1.446	0.64	-5.43±1.432	3.79	-6.60±1.594	4.14

	I 11 - I 111			I 11 - C1			I 11 - C11			I 111 - C1		
	Diff. and error of diff.		Crit. Ratio	Diff. and error of diff.		Crit. Ratio	Diff. and error of diff.		Crit. Ratio	Diff. and error of diff.		Crit. Ratio
H.C.	6.00	3.153	1.90	-5.03	3.141	1.60	-12.70	3.432	3.70	-11.03	2.658	4.15
S.A.	4.95	3.211	1.54	7.26	3.200	2.27	-8.10	3.496	2.32	2.31	2.708	0.85
F.A.	2.88	1.453	1.98	2.58	1.378	1.87	2.76	1.505	1.83	-0.30	1.165	0.26
P.A.	4.23	1.990	2.13	6.29	1.955	3.22	-1.02	2.166	0.47	2.06	1.678	1.23
O.A.	-0.30	1.962	0.15	0.90	1.955	0.46	-9.32	2.138	4.36	0.39	1.664	0.23
T.A.	2.94	2.768	1.06	-20.07	2.758	7.28	-12.64	3.013	4.20	-23.01	2.334	9.86
C.L.	3.40	1.399	2.43	11.56	1.394	8.29	0.57	1.523	0.37	8.16	1.179	6.92
C.B.	-0.94	1.368	0.69	-15.04	1.363	11.03	-9.0	1.489	6.04	-14.10	1.153	12.23
B.B.H.	2.41	1.291	1.87	-1.32	1.287	1.03	-2.39	1.405	1.70	- 3.73	1.089	3.43
B.N.L.	1.19	1.182	1.01	4.40	1.176	3.74	2.86	1.282	2.23	3.21	0.311	10.32
B.B.	0.69	1.128	0.61	-8.85	1.111	7.97	-7.04	1.222	5.76	-9.54	0.955	9.98
M.F.B.	2.77	0.940	2.95	2.87	0.988	2.90	3.04	1.080	2.81	0.10	0.775	0.13
F.C.	2.94	1.102	2.67	0.55	1.098	0.50	1.42	1.199	1.18	-2.39	0.930	2.57
P.C.O	2.83	1.535	1.84	7.74	1.530	5.06	0.19	1.339	0.14	4.91	1.295	3.79
O.C.	-1.04	1.444	0.72	-3.63	1.439	2.52	-7.18	1.572	4.57	-2.59	1.218	2.13
B.P.L.	3.32	1.195	2.78	3.96	1.191	3.32	3.51	1.302	2.70	0.64	1.008	0.63
F.M.L	0.12	0.614	0.20	-1.07	0.607	1.76	-0.57	0.663	0.86	-1.19	0.519	2.29

	I 11 - I 111		I 11 - C1		I 11 - C11		I 111 - C1	
	Diff. and error of diff.	Crit. Ratio	Diff. and error of diff.	Crit. Ratio	Diff. and error of diff.	Crit. Ratio	Diff. and error of diff.	Crit. Ratio
F.M.B.	-1.22 0.538	2.27	-1.10 0.535	2.06	-0.86 0.585	1.47	0.12 0.453	0.26
B.	0.28 1.146	0.24	-6.15 1.141	5.39	-5.82 1.247	4.67	-6.43 0.965	6.66
U.F.H.	0.98 1.095	0.89	-5.68 1.091	5.21	-5.46 1.192	4.58	-6.66 0.923	7.22
N.H.	0.83 0.694	1.20	-2.95 0.692	4.26	-2.69 0.756	3.56	-3.78 0.586	6.45
N.B.	0.42 0.473	0.89	0.24 0.472	0.51	-0.15 0.516	0.29	-0.18 0.399	0.45
L.O.H.	0.18 0.513	0.35	-1.92 0.511	3.76	-2.33 0.559	4.17	-2.10 0.431	4.87
L.O.B.	0.36 0.390	0.92	0.96 0.385	2.49	-0.86 0.421	2.04	0.60 0.329	1.82
B.Br.	0.99 0.806	1.23	1.47 0.803	1.83	0.97 0.878	1.10	0.48 0.679	0.71
E.B.	1.31 0.910	1.44	0 0.907	0	-0.17 0.990	0.17	-1.31 0.767	1.71
C.I.	-1.94 0.896	2.17	-13.70 0.892	15.36	-5.53 0.975	5.67	-11.76 0.755	15.58
L.H.I.	-0.08 1.071	0.07	-6.16 1.817	3.39	-1.85 1.293	1.43	-6.08 1.437	4.23
B.H.I.	2.45 1.119	2.19	9.46 1.115	8.48	4.85 1.218	3.98	7.01 0.943	7.43
F.P.I.	2.31 0.715	3.23	7.20 0.704	10.23	6.42 0.769	8.35	4.89 0.606	8.07
C.F.I.	1.18 1.300	0.91	4.07 1.294	3.15	1.14 1.328	0.86	2.89 1.251	2.31
U.F.I.	0.45 0.865	0.52	-0.81 0.853	0.95	-1.39 0.931	1.49	-1.26 0.733	1.72
N.I.	-0.11 0.980	0.11	3.26 0.977	3.34	2.24 1.066	2.10	3.37 0.827	4.07
L.O.I.	-0.54 1.376	0.39	-6.89 1.361	5.06	-8.06 1.530	5.27	- 6.35 1.163	5.48

	I 111 - C11		C1 - C11	
	Diff. and error of diff.	Critical Ratio	Diff. and error of diff.	Critical Ratio
H.C.	-18.70 2.996	6.24	-7.67 2.984	2.57
S.A.	-13.05 3.052	4.28	-15.36 3.040	5.05
F.A.	-0.12 1.314	0.09	0.18 1.312	0.14
P.A.	-5.25 1.891	2.78	-7.31 2.133	3.43
O.A.	-9.02 1.849	4.88	-9.41 1.869	5.03
T.A.	-15.58 2.630	5.92	7.43 2.620	2.84
C.L.	-2.83 1.329	2.13	-10.99 1.324	8.30
C.B.	-8.06 1.300	6.20	6.04 1.295	4.66
B.B.H.	-4.80 1.226	3.92	-1.07 1.222	0.88
B.N.L.	1.67 1.108	1.51	-1.54 1.103	1.40
B.B.	7.73 1.083	7.14	1.81 1.065	1.70
M.F.B.	0.27 0.889	0.30	0.17 0.940	0.18
F.C.	-1.52 1.046	1.45	0.87 3.297	0.26
P.C.	-2.64 1.062	2.49	-7.55 1.055	7.16
O.C.	-6.14 1.372	4.48	-3.55 1.367	2.60
B.P.L.	0.19 1.136	0.17	-0.45 1.132	0.40

	I 111 - C11		C1 - C11	
	Diff. and error of diff.	Critical Ratio	Diff. and error of diff.	Critical Ratio
F.M.L.	-0.69 0.584	1.18	0.50 0.575	0.87
F.M.B.	0.36 0.511	0.70	0.24 0.508	0.47
B.	-6.10 1.089	5.60	0.33 0.935	0.35
U.F.H.	-6.44 1.040	6.19	0.22 1.035	0.21
N.H.	-3.52 0.660	5.33	0.26 0.657	0.46
N.B.	-0.57 0.449	1.27	-0.39 0.448	0.87
L.O.H.	-2.51 0.487	5.15	-0.41 0.485	0.85
L.O.B.	0.50 0.370	1.35	-0.10 0.365	0.27
B.Br.	-0.02 0.766	0.03	-0.50 0.763	0.66
E.B.	-1.48 0.864	1.71	-0.17 0.861	0.20
C.I.	-3.59 0.851	4.22	8.17 0.848	9.63
L.H.I.	-1.77 0.976	1.81	4.31 1.693	2.55
B.H.I.	2.40 1.063	2.26	-4.61 1.059	4.35
F.P.I.	4.11 0.680	6.04	-0.78 0.669	1.17
C.F.I.	-0.04 1.286	0.03	-2.93 1.280	2.29
U.F.I.	-1.84 0.823	2.24	-0.58 0.810	0.72
N.I.	2.35 0.931	2.52	-1.02 0.927	1.10
L.O.I.	-7.52 1.357	5.54	-1.17 1.342	0.87

TABLE VI.

Significant 'Critical Ratio' between Male South Asian Cranial series

Character	B1 &B11	B1-I1	B1-I11	B1-I111	B1-C1	B1-C11	B11-I1	B11-I11	B11-I111
H.C.	2.83	4.30	2.08	4.38	-	-	-	-	-
S.A.	2.69	-	-	-	-	3.25	-	3.31	2.27
F.A.	-	-	-	-	-	-	-	2.48	-
P.A.	-	-	-	-	-	2.09	-	2.70	-
O.A.	2.75	3.04	-	-	-	3.51	-	-	2.13
T.A.	-	-	3.74	5.40	3.36	-	2.06	4.07	5.51
C.L.	5.15	2.12	2.30	-	6.09	2.01	2.87	7.05	4.68
C.B.	2.12	-	4.38	4.29	6.58	-	2.95	6.00	6.05
B.B.H.	-	-	-	2.61	-	-	-	-	-
B.N.L.	-	-	2.22	-	-	-	-	2.10	-
B.B.	-	3.72	6.13	7.55	-	-	4.33	6.52	7.76
M.F.B.	-	-	-	2.35	2.33	2.28	-	-	-
F.C.	-	-	-	-	-	-	-	-	-
P.C.	-	-	2.51	-	2.44	2.50	-	4.13	2.90
O.C.	2.38	3.03	2.23	-	-	2.44	-	-	-
B.P.L.	-	-	-	2.42	2.99	2.36	-	-	-
F.M.L.	-	-	2.17	2.66	-	-	-	-	-
F.M.B.	-	-	2.21	-	-	-	-	-	-
B.	-	2.14	5.04	6.01	-	-	2.50	5.13	5.94
U.F.H.	-	-	2.29	3.57	2.85	2.38	-	3.17	4.36
N.H.	-	2.46	3.28	5.02	-	-	2.13	2.85	4.28
N.B.	-	3.79	2.00	3.23	2.83	-	3.18	-	2.51
L.O.H.	-	-	2.49	3.22	-	-	-	3.00	3.67
L.O.B.	-	-	-	-	2.60	2.11	-	-	-
Biorb.	-	-	-	-	-	-	-	-	-
Ext.Bio.	-	-	-	2.67	-	-	-	-	3.15
C.I.	5.66	-	5.18	3.65	10.20	-	5.03	10.14	9.29
L.H.I.	2.20	-	-	-	2.55	-	-	3.21	4.06
B.H.I.	2.41	-	3.63	-	4.76	-	2.91	5.60	4.22
F.P.I.	-	4.17	6.25	3.68	3.49	2.12	5.64	7.56	5.35
C.F.I.	-	-	-	-	3.69	-	-	-	-
U.F.I.	-	-	-	-	2.14	2.59	-	-	-
N.I.	-	-	-	-	2.76	-	-	-	-
L.O.I.	-	-	2.45	2.37	2.34	2.85	-	2.78	2.72

* The level of 'Critical Ratio' less than 2.0 has been represented in this Table by -, denoting a non-significant figure.

Character	BII-CI	BII-CII	II-III	II-IIII	II-CI	II-CII	III-IIII	III-CI	III-CII	IIII-CI	IIII-CII	CI-CII
H.C.	2.44	4.35	2.22	-	4.02	5.85	-	-	3.70	4.15	6.24	2.57
S.A.	-	5.59	2.26	-	-	4.57	-	2.27	2.32	-	4.28	5.05
F.A.	-	-	-	-	-	-	-	-	-	-	-	-
P.A.	-	3.23	-	-	2.27	-	2.13	3.22	-	-	2.78	3.43
O.A.	-	5.90	2.05	2.46	2.25	6.27	-	-	4.36	-	4.88	5.03
T.A.	2.05	-	-	3.23	4.69	-	-	7.28	4.20	9.86	5.92	2.84
C.L.	-	6.94	4.16	2.36	3.20	3.96	2.43	8.29	-	6.92	2.13	8.30
C.B.	3.47	-	3.02	2.73	7.09	2.66	-	11.03	6.04	12.23	6.20	4.66
B.B.H.	-	-	-	-	-	-	-	-	-	3.43	3.92	-
B.N.L.	-	-	-	-	2.50	-	-	3.74	2.23	10.32	-	-
B.B.	-	-	2.09	2.91	5.22	3.36	-	7.97	5.76	9.98	7.14	-
M.F.B.	-	-	-	2.89	2.86	2.79	2.95	2.90	2.81	-	-	-
F.C.	-	-	-	-	-	-	2.67	-	-	2.57	-	-
P.C.	-	4.17	2.15	-	2.38	2.12	-	5.06	-	3.79	2.49	7.16
O.C.	2.64	4.56	-	-	3.37	5.27	-	2.52	4.57	2.13	4.48	2.60
B.P.L.	-	-	-	-	-	-	2.78	3.32	2.70	-	-	-
F.M.L.	-	-	-	-	-	-	-	-	-	2.29	-	-
F.M.B.	-	-	-	-	-	-	2.27	2.06	-	-	-	-
B.	-	-	2.61	3.15	2.19	-	-	5.39	4.67	6.66	5.60	-
U.F.H.	-	-	2.11	3.21	2.58	2.20	-	5.21	4.58	7.22	6.19	-
N.H.	-	-	-	-	3.31	2.72	-	4.26	3.56	6.45	5.33	-
N.B.	2.17	-	-	-	-	2.16	-	-	-	-	-	-
L.O.H.	-	-	-	2.12	-	2.35	-	3.76	4.17	4.87	5.15	-
L.O.B.	2.85	2.42	-	2.37	3.88	3.55	-	2.49	2.09	-	-	0.27
Biorb.	2.16	-	-	-	-	-	-	-	-	-	-	-
Ext.Bio.-		-	-	-	-	-	-	-	-	-	-	-
C.I.	2.83	5.20	5.05	3.59	8.90	-	2.17	15.36	5.67	15.58	4.22	9.63
L.H.I.	-	2.20	-	2.40	-	-	-	3.39	-	4.23	-	2.55
B.H.I.	-	2.08	2.65	-	5.08	-	2.19	8.48	3.98	7.43	2.26	4.35
F.P.I.	-	-	-	-	7.74	6.17	3.23	1 0.23	8.35	8.07	6.04	-
C.F.I.	2.56	-	-	-	2.24	-	-	3.15	-	2.31	-	2.29
U.F.I.	-	-	-	-	-	-	-	-	-	-	2.24	-
N.I.	2.55	-	2.05	2.40	-	-	-	3.34	2.10	4.07	2.52	-
L.O.I.	-	2.12	-	-	3.79	4.14	-	5.06	5.27	5.48	5.54	-

General Consideration

The form both of the brain case and the face are also expressed by indices. In its simplest form an index is the percentage ratio of one measure to a second. For convenience the values of certain indices are grouped into arbitrary categories.

The arbitrary categories based on the values given by Harrower (1928) and Martin (1928) are utilized for the first five indices and analysis of the metrical features is made on that basis. In the last three indices (Angel 1944) the low or high values of the indices concerned are given in the analysis only. The indices used in this study together with their divisions into categories are given below.

1. Cranial Index, 100 maximum cranial breadth ÷ maximum cranial length.
   Values are grouped according to Martin.
   ~~Harrower~~

Under 75	dolichocephalic or dolichocranial
75 - 79.9	mesaticephalic or mesocranial
80 or over	brachycephalic or brachycranial

2. Length-height index (vertical index), 100 basi-bregmatic height ÷ cranial length

69.9 or under chamaecephalic or chamaecranial

70.0 - 74.9 ~~metriocephalic or metriocranial~~, orthocranial

75.0 or over hypsicephalic or hypsicranial

3. Nasal index, 100 nasal breadth ÷ nasal height

46.9 or under leptorrhine (narrow nosed)

47.0 - 50.9 mesorrhine (medium nosed)

51 or over Platyrrhine (broad nosed)

4. Left orbital index, 100 orbital height ÷ orbital breadth

Under 84 microsemic (low orbit)

84 - 89 mesosemic (medium orbit)

over 89 megasemic (high orbit)

5. Upper facial index, 100 upper facial height ÷ bizygomatic breadth

Values are grouped according to Martin (1928)

under 50 euryprosopic (broad faced)

50 - 55 mesoprosopic (medium faced)

55 or over leptoprosopic (narrow faced)

6. Breadth-height index, 100 basi-bregmatic height ÷ cranial breadth.

7. Fronto-parietal index, 100 minimum frontal breadth ÷ cranial breadth.
8. Cranio-facial index, 100 byzygomatic breadth ÷ cranial breadth.

Analysis of Metrical Characters

South East Asian Series:

At the 2.5 level of the critical ratios, these two series (B1 and B11) differ significantly from one another in five characters: horizontal circumference, sagittal arc, occipital arc, cranial length and cranial index. All these five differences largely express one fact, the greater cranial length of type B1 compared with type B11. The difference in cranial index is accentuated by the lower cranial breadth of type B1 compared with type B11, but this difference is significant only at the 2.0 level. Other characters which are significantly different

at the 2.0 level are: occipital chord, length-height index and breadth-height index. The latter pair reflect the fact that cranial height is almost identical in the two groups; thus in type B1 it is higher in relation to breadth, in type B11 higher in relation to length. The occipital chord and occipital arc express the difference in occipital form between the two cranial types.

Indian Series:

At the 2.5 level, type I 1 is significantly different from both type I 11 and type I 111 in cranial breadth, cranial index and also in bimaxillary breadth, that is both the latter types have moderately narrow brain cases and also narrower faces. At the 2.0 level, type I 1 also differs from both the other types in cranial length, byzygomatic breadth and upper facial height. The brain case of type I 1 is shorter and the face longer as well as wider. Characters in which type I 1 differs from type I 11 alone are (at the 2.0 level), horizontal circumference, sagittal arc, occipital arc, nasal index and (at the 2.5 level) breadth-height index, all except the last two characters reflect the greater length of the

cranium in type I 11.

Indian types I 11 and I 111:

At the 2.5 level, the mean of minimum frontal breadth, frontal chord and basion-~~prosthion~~ alveolare length is significantly larger in type I 11 as compared with type I 111. Because of the difference in minimum frontal breadth compared with the close similarity in cranial breadth, the fronto-parietal index is significantly higher in type I 11. At the 2.0 level the former two are larger in type I 11 and later are larger in type I 111, cranial length, parietal arc and foramen magnum breadth. On account of the differences in cranial length, the cranial index is significantly higher in type I 111. The breadth-height index is also significantly different at this level, being higher in type I 11, although the difference in the basi-bregmatic height is not significant.

Chinese Series:

The number of differences between types C1 and C11 which are significant at the 2.5 level is remarkable. They are cranial length, cranial breadth, horizontal circumference, sagittal arc, parietal arc, occipital arc, transverse arc, parietal chord, occipital chord, cranial index, length-height index and

breadth-height index. Of these, type C11 has the greater values for all the measurements in the sagittal plane (cranial length, sagittal arc, parietal arc, parietal chord, occipital arc, occipital chord), whereas the values of cranial breadth and transverse arc are greater in type C1. These opposed trends result in the well marked differences in cranial index and breadth-height index, but tend to minimise the difference in horizontal circumference.

It is equally noteworthy that at the 2.0 level more differences reach a significant value, for example, the cranio-facial index. The slight and insignificant increase in byzygomatic breadth in type C1 is not proportional to the great difference in parietal breadth.

These findings show there are marked differences between the various types within each series, while a cursory glance at Table VI shows that there are certain similarities between the various types of each series and the types of the other series. These similarities are clearly seen in the following cases - the South East Asian type B1 has many tendencies in common with the Chinese type C11, and conversely types B11 and C1 have much in common. Similarly, type I 1 has resemblances to both types B1 and C11.

Since there appear to exist three similar groups as stated, it is worth while to examine the differences which are present within these groups in more detail.

South East Asian (Burmese) type B1 and Indian type I 1):

Type B1 differs significantly from type I 1 at the 2.5 level in six characters: type B1 has greater byzygomatic breadth, nasal breadth and horizontal circumference. The occipital arc and occipital chord express the difference in occipital form between these two cranial types being shorter in type I 1 as compared with type B1. The fronto-parietal index is significantly smaller in the type B1, but the relatively greater breadth of type B1 tends to exaggerate this factor as compared with narrower type I 1. Type B1 is longer in brain case and has a broader face as compared with type I 1, but this difference is significant only at the 2.0 level for the characters of cranial length and bimaxillary breadth.

South East Asian (Burmese) type B11 and Chinese type C1.):

At 2.5 level, type C1 is significantly wider than type B11 in cranial breadth. However, the left orbital breadth is significantly wider in type B11 than type C1. The occipital chord is greater

in type C1 and differs significantly from type B11. The cranial index has a higher figure in type C1 and differs significantly from type B11, however, bringing them together into the range of brachy-cranial. The nasal index shows a higher figure in type B11 and differs significantly from type C1. This higher figure may be attributed to the relatively greater reduction in nasal height than in nasal breadth in type B11. Type C1 also differs significantly from type B11 in cranio-facial index which is high for type B11. At the 2.0 level, the nasal breadth is significantly wider in type B11 than in type C1. Type C1 differs from type B11 as regards the two dimensions of the brain case, that is horizontal circumference and transverse arc which are greater in type C1 than type B11.

South East Asian type B1 and Chinese type C11:

At 2.5 level, the mean of sagittal arc, occipital arc, parietal chord, upper facial index and left orbital index are significantly larger in type C11 than in type B1. At 2.0 level, parietal arc, cranial length, occipital chord and upper facial height are significantly larger in type C11 than in type B1 while minimum frontal breadth, basion-prosthion length,

left orbital breadth and fronto-parietal index are significantly larger in type B1 than in type C11.

Indian type I 1 and Chinese type C11:

At 2.5 level, the type C11 differs significantly from type I 1 as regards horizontal circumference, sagittal arc, occipital arc, occipital chord and cranial length which are larger in type C11. As regards cranial breadth and byzygomatic breadth, type C11 differs significantly from type I 1 in having a broader head and a wider face. However, left orbital breadth and minimum frontal breadth are narrower in type C11 and differ significantly from type I 1. The fronto-parietal index is significantly smaller in type C11, but the relatively greater cranial (parietal) breadth of type C11 tends to exaggerate this factor, as compared with the narrower type I 1. The nasal height and left orbital index are greater in type C11 and significantly differ from type I 1. At 2.0 level, type C11 is greater and significantly differs from type I 1 as regards parietal chord, upper facial height, nasal breadth and left orbital height.

Mean Index Values.

Cranial index: Types I 11 and I 111 have a mean cranial index well below the upper limit of the dolichocranial range. In types B1, I 1 and C11 the mean cranial index falls just above the lower limit of the mesocranial range. There is thus a wide gap between these types and the remaining two, types B11 and C1, which are both brachycranial.

Length-height index: Types I 11 and I 111 have a mean value for the index of metriocranial, while all the remaining types give a hypsicranial mean value. There is clearly a distinction between types B1, I 1 and C11, where the mean index only just enters the hypsicranial range, and types B11 and C1 where it is considerably higher.

Breadth-height index: Types B11 and C1 are here distinguished by the lowest values for the mean index, while type I 11 gives the highest value. Type I 111 in this case approaches more closely to types I 1, B1 and C11.

Fronto-parietal index: The South East Asian and Chinese series agree in showing lower mean values for this index than that of Indian series of which type I 11 gives a higher value than types I 1 and I 111.

Cranio-facial index: There is little difference between the means of the types for this index except for type C1 which gives an unusually low figure.

Upper facial index: All the mean values fall within the mesoprosopic range.

Nasal index: The two Chinese types and type I 1 give a leptorrhine mean index, whereas the four remaining types all give a mesorrhine value.

Left orbital index: The two Chinese types are distinguished by a mean index which is mesosemic. All the remaining types are microsemic, but there is a clear distinction between the South-East Asian types (index 82 - 83) and the Indian types (index 78 - 80).

Relation of Cranial and Facial Indices.

A study of the correlation between the cranial and upper facial indices brings out some noteworthy facts. With the material available, this study is best effected by dividing the crania into the three primary cranial index groups, and each of which is then subdivided by means of the three facial index groups. In this way nine subgroups are obtained and the numbers of cranial falling into each of these is given in Table VII.

TABLE VII.

		Bl	Bll	Il	Ill	Illl	Cl	Cll
Dolicho-cranial	Euryoprosopic	1	0	5	6	13	0	1
	Mesoprosopic	9	0	2	14	20	0	1
	Leptoprosopic	3	0	2	6	4	2	6
Meso-cranial	Euryoprosopic	8	3	3	1	2	0	1
	Mesoprosopic	5	2	6	1	4	6	9
	Leptoprosopic	2	2	1	0	3	1	11
Brachy-cranial	Euryprosopic	1	3	1	0	0	6	2
	Mesoprosopic	2	10	3	0	0	22	2
	Leptoprosopic	1	2	1	0	1	14	0

Analysed in this way, Type Bl has as the most frequent combinations dolichocranial - mesoprosopic and mesocranial - euryprosopic. Type Bll on the contrary is dominated by the brachycranial - mesoprosopic combination. In Type I l the meso-

cranial - mesoprosopic and dolichocranial - euryprosopic combinations are most frequent; in both types I 11 and I 111 the predominant combination is dolichocranial -mesoprosopic, with dolichocranial - euryprosopic as a secondary group in Type I 111. Type C1 is dominated by the brachycranial - mesoprosopic combination with a contributing aggregation of brachycranial - leptoprosopic, while in Type C11 the most frequent combinations are mesocranial - lepto-prosopic and mesocranial - mesoprosopic.

It has become customary to describe as harmonic those crania which are dolichocranial - leptoprosopic, mesocranial - mesoprosopic, and brachycranial - euryprosopic. Crania presenting other combinations of the cranial and facial indices are said to be disharmonic. Hooton (1925) established two classes of disharmony: Class I comprising dolichocranial - euryprosopic and brachycranial - leptoprosopic skulls, and Class II comprising mesocranial skulls which are either leptoprosopic or euryprosopic, and mesoprosopic skulls which are either dolichocranial or brachycranial.

In Table VIII the data of Table Vii have been regrouped in accordance with Hooton's classification.

TABLE VIII.

Class 1:	B1	B11	I1	I11	I111	C1	C11
A. Dolichocranial euryprosopic	1	-	5	6	13	-	1
B. Brachycranial leptoprosopic	1	2	1	-	1	14	-
	2	2	6	6	14	14	1
Class 2:							
A. Mesocranial euryprosopic	8	3	3	1	2	-	1
B. Mesocranial leptoprosopic	2	2	1	-	3	1	11
C. Dolichocranial mesoprosopic	9	-	2	14	20	-	1
D. Brachycranial mesoprosopic	2	10	3	-	-	22	2
	21	15	9	15	25	23	15
Class 3: (Harmonic)							
A. Dolichocranial leptoprosopic	3	2	2	6	4	2	6
B. Mesocranial mesoprosopic	5	2	6	1	4	6	9
C. Brachycranial euryprosopic	1	3	1	-	-	6	2
	9	7	9	7	8	14	17

In Table VIII the data have been regrouped in accordance with this classification. From this the total of strongly disharmonic (Class I), moderately disharmonc (Class 2) and Harmonic (Class 3) in each of the seven groups can be determined. It is found that in all types except I 1 and C11 the greatest number of crania are moderately disharmonic, and only in type C11 does the total of harmonic crania exceed that of all the disharmonic. Among the other groups type I 111 is distinguished by having more strongly disharmonic than harmonic crania.

Most conspicuously in type I 111, and to a less degree in types I 11, I 1 and B1, the cranio-facial disharmony is the result of the association of a short face with a long or moderately long cranium. On the contrary, in type C1, and to a less degree in types C11 and B11, a relatively long face is associated with a short brain case.

The Chi-square test is applied to the classes of cranio-facial disharmony and harmony to test the hypothesis that these characters in the South Asian cranial series show heterogeneity. Table IX shows a test giving positive results for heterogeneity in all the above classes marked + in table to be significant at .01.

TABLE IX/

TABLE IX.

	Nos.	Degree of Freedom	χ^2	Significant at .01
Class 1	45	6	45.905	+
Class 2	123	18	149.961	+
Class 3 (Harmonic)	69	12	26.289	+

TABLE X.

Males

South Asian Series	Disharmonic		Harmonic
	Class 1	Class 2	Class 3
Type B1	2	21	9
Type B11	2	15	5
Type I 1	6	9	9
Type I 11	6	15	7
Type I 111	14	25	8
Type C1	14	23	14
Type C11	1	15	17

Inspection of Table X shows that of the South Asian series Types B1, B11, I 11, I 111 and C1 all show predominately a class 2 disharmony, while Type I 1 shows an equal number of harmonic and class 2

disharmonic crania, and Type C11 has a higher frequency of harmonic and also shows class 2 disharmony in almost equal proportion.

Hooton (1925) expresses the opinion that pure dolichocranial types are normally associated with both mesoprosopic and leptoprosopic upper facial indices, but rarely or never with euryprosopic upper facial indices. Pure brachycranial types are probably associated normally with euryprosopic or mesoprosopic indices, but not with leptoprosopic upper facial indices. He therefore regards class 1 disharmony as resulting from a mixture between dolichocranial and brachycranial pure types, or possibly as the result of certain combinations of inheritance resulting from the mixture of similar types differing greatly in respect of size.

In 1946, however, he writes, 'It now seems to me that the increase in breadth of the face and compensatory diminition in its height can occur in either a long or a round-headed stock and the association of the broad low face with the long, narrow skull is not always due to hybridisation and should not be termed "cranial disharmony".' This conclusion is especially relevant to the high frequency of this particular combination of features in Indian series type I 111.

The Characteristic metrical features of the seven types

South East Asian type B1: It is characterized by a moderate long vault, high in relation to length and breadth. It varies from dolichocranial to mesocranial, metriocranial to hypsicranial, leptoprosopic to mesoprosopic. It is microsemic and has the mesorrhine form of the nose.

South East Asian type B11: This type is characterized by a short and wide vault, high in relation to length but not to breadth. It varies from mesocranial to brachycranial, and is hypsicranial. It varies from leptoprosopic to mesoprosopic. It is microsemic and has the mesorrhine form of nose.

Indian type I 1: It is characterized by a moderately long vault, high in relation to length but not to breadth. It varies from dolichocranial to mesocranial, metriocranial to hypsicranial, leptoprosopic to mesoprosopic. It is microsemic (below 80) and has the leptorrhine form of nose.

Indian type I 11: This type is characterized by a long vault, high in relation to breadth but not to length. It is dolichocranial, and varies from metriocranial to hypsicranial, leptoprosopic to mesoprosopic. It is microsemic (below 80) and has

the mesorrhine form of nose.

Indian type I 111: It is characterized by a long vault, high in relation to breadth but not to length. It is dolichocranial and metriocranial. It varies from leptoprosopic to mesoprosopic. It is microsemic (below 80) and has the mesorrhine form of nose.

Chinese type C1: This type is characterized by a short vault, high in relation to length but not to breadth. It is brachycranial, hypsicranial and mesoprosopic. It is mesosemic and has the leptorrhine form of nose.

Chinese type C11: It is characterized by a moderate long vault, high in relation to length and breadth. It varies from dolichocranial to mesocranial, metriocranial to hypsicranial. It is mesoprosopic, mesosemic and has the leptorrhine form of nose.

Non-metrical features of South Asian Cranial types:

'But in many particulars a skulls when exhaustively measured remains undescribed, and measurements themselves are arbitrary numbers which, no matter how valuable they may be in the study of a race may have slight value in increasing our knowledge of the skull itself . . . . The result is that elaborate memoirs embracing results which are conclusive so far as mere measurements are concerned, are inconclusive, for the thoughtful anatomist of many interesting facts.' Allen (1894-1896).

Hence, tne non-metrical characters in mature male South Asian cranial types have been studied. The list of characters used by Angel (1944) has been taken as a basis. Certain characters used by him have been discarded as of insufficient value. In other cases, Angel's grading of the characters has been modified in the light of experience during the present investigation, the number of grades of each character has sometimes been increased or decreased. The following non-metrical characters described by other workers than Angel have been included in this study. Cranial Asymmetry (Wood Jones 1931), Parietal Bosses Frassetto quoted by Gear 1929), Headform (Frassetto quoted by Gear 1929 and Gates 1948), Frontal Bosses

Frassetto quoted by Gear 1929), Metopic Suture (Montagu 1937), Spheno-maxillary fissure (Duckworth quoted by Wood Jones 1931), Anterior Nasal spine 5 types (Martin 1928, Fig. 427 p. 948), Nasal Profile (Martin 1928, Fig. 429 p. 946), Nasal Form 3 types (Martin 1928, Fig. 427 p. 943) corresponding in order (I, II and III) to the last three figures on the top row), Configuration of the lower margin of the Nasal Aperture (Martin 1928, Fig. 432 p. 946), Shape of Dental Arcade (Shaw 1931). (This character is only taken into account in those skulls showing a complete or nearly complete dentition.) Palate Height (Shaw 1931), Occipital Condyles 2 types corresponding to Martin's (1928) description of variations in condylar form. Type I - low, broad, slightly raised with a small curve; Type III - long, narrow, high and strongly curved and Type II intermediate to these two types, the type I has short, flat, rounded condyles as observed by Wood Jones (1931), and to these have been added characters of the External Occipital Protuberance and Fronto-Nasal Articulation.

(Plate Nos. 34, 31 - 32, 33, 44, 45 and 46, Vol. II.)

The procedure adopted to sort out the non-metrical characters is just to select crania showing clearly the various types of each character and then

to compare the remaining crania against these standards. The observations are repeated till a constant arrangement of crania is obtained for a particular character. Photographs of some of the standards are given (Plates Nos. 31 - 46, Vol. 11).

The numerical type distribution of non-metrical characters among each of the seven types from the South Asian Cranial series and the total non-metrical characters in the total series have been tabulated in table XI.

TABLE XI/

TABLE XLI.

Observations on the South Asian Cranial Series

Character	Numerical distribution by type							
	B1	B11	I1	I11	I111	C1	C11	Characters in total series
Cranial Asymmetry(241):								
a. Normal	6	7	5	1	10	16	5	50
b. Reversed	5	8	3	3	7	16	2	44
c. Symmetry	22	7	16	24	33	19	26	147
Parietal bosses(241):								
a. Foetal	13	0	6	13	18	4	15	69
b. Infantile	11	1	8	6	21	1	10	58
c. Adult	9	21	10	9	11	46	8	114
Headform(241):								
a. Pentagonoid	7	0	2	13	18	1	7	48
b. Eurypentagonoid	6	0	4	0	0	3	8	21
c. Ovoid	11	1	3	6	20	1	7	49
d. Sphenoid	0	0	5	0	1	0	3	9
e. Ellipsoid	4	3	2	9	9	1	3	31
f. Spheroid	5	18	8	0	2	45	5	83
Frontal bosses(241):								
a. Foetal	5	2	6	5	10	6	6	40
b. Infantile	14	11	8	5	12	32	17	99
c. Adult	14	9	10	18	28	13	10	102
Forehead slope(241):								
a. Inclined low	15	6	6	14	15	19	13	88
b. Inclined high	5	5	7	0	5	17	7	46
c. Vertical low	7	5	5	7	24	10	11	69
d. Vertical high	6	6	6	7	6	5	2	38

Character	Numerical distribution by type							
	B1	B11	I1	I11	I111	C1	C11	Characters in total series
Metopic Suture(241):								
a. Supra Nasal portion present	0	0	0	1	3	3	1	8
b. Bregmatic portion present	0	0	0	0	0	0	0	0
c. Completely obliterated	33	21	22	25	45	45	29	220
d. Partially obliterated	0	0	0	1	2	2	0	5
e. Completely present	0	1	2	1	0	1	3	8
Brow ridge size(241):								
a. Type I	14	5	2	2	3	18	17	61
b. Type II	4	9	12	11	20	23	10	89
c. Type III	9	6	6	7	16	9	4	57
d. Type IV	6	2	4	8	11	1	2	34
Sagittal crest(241):								
a. Absent	4	8	6	5	13	20	7	63
b. Present	29	14	18	23	37	31	26	178
Parieto-occipital Region(241):								
a. Hemispherical	19	0	4	8	10	5	21	67
b. Protuberant	12	0	3	15	26	4	10	70
c. Flattened	1	21	7	2	7	40	2	80
d. Flattened with protuberance	1	1	4	0	2	2	0	10
e. Inclined with protuberance	0	0	6	3	5	0	0	14

Character	Numerical distribution by type							
	B1	B11	I 1	I 11	I 111	C1	C11	Characters Total ser
External Occipital Protuberance (241):								
a. None	0	2	4	5	8	9	0	28
b. Sharp edge	0	2	7	11	12	0	0	32
c. Round tubercle	30	14	10	11	30	27	26	148
d. Hook like	3	4	3	1	0	15	7	33
Lambdoid Flatenning (241):								
a. None	26	6	18	26	47	35	25	183
b. Present	7	16	6	2	3	16	8	58
Occipital Torus Size(241):								
a. None	18	14	6	7	28	20	11	104
b. Small	3	5	11	13	9	11	4	56
c. Medium	10	3	7	8	13	16	15	72
d. Pronounced	2	0	0	0	0	4	3	9
Mastoid Size (237):								
a. Small	4	4	3	5	6	5	8	35
b. Medium	19	11	15	16	32	38	19	150
c. Large	8	7	6	7	10	8	6	52
Ext. Auditory Meatus (241):								
a. Round	7	5	5	5	13	10	6	51
b. Elliptical	7	3	3	4	3	19	9	48
c. Oval	19	14	16	19	34	22	18	142
Temporal Bulge (241):								
a. Flat	3	0	0	4	1	1	0	9
b. Slight	8	1	5	10	17	7	5	53
c. Moderate	12	11	13	8	21	16	13	94

Character	Numerical distribution by type							Characters in Total series
	B1	B11	I 1	I 11	I 111	C1	C11	
d. Localized prominence	6	4	2	6	6	4	7	35
e. Pronounced	4	6	4	0	6	22	8	50
Orbit. Form of Margin (241):								
a. Ellipsoid	4	1	2	7	12	4	2	32
b. Oblong	6	1	11	10	14	3	2	47
c. Square	12	8	4	2	13	25	10	74
d. Rhomboid	11	12	7	9	11	19	19	88
Orbit Slope (241):								
a. Oblique	23	20	16	21	31	44	32	187
b. Transverse	10	2	8	7	19	7	1	54
Spheno-maxillary fissures (234):								
a. Normal	11	8	5	6	16	16	13	75
b. Wide	7	9	12	10	13	14	10	75
c. Laterally expanded	14	4	5	8	11	7	3	52
d. Narrow	1	1	1	4	4	14	7	32
Cheek bone (239):								
a. Small	4	3	11	17	23	6	2	66
b. Medium	16	8	9	8	25	23	19	108
c. Large	13	11	4	3	1	22	11	65
Malar Projection (239):								
a. Laterally	6	5	20	24	43	3	6	107
b. Antero-laterally	27	17	4	4	6	48	26	132
Prognathism (241):								
a. Absent	7	2	2	0	0	1	3	12
b. Slight	28	19	20	25	40	31	17	180
c. Pronounced	1	1	2	3	10	19	13	49

Character	Numerical distribution by type							Characters in Total Series
	B1	B11	I 1	I 11	I 111	C1	C11	
Alveolar Prognathism (241):								
a. Absent	26	18	20	15	47	26	20	172
b. Present	7	4	4	13	3	25	13	69
Anterior Nasal Spine (223):								
a. Type I	8	3	3	2	8	5	4	33
b. Type II	16	10	10	13	24	30	16	119
c. Type III	2	4	4	3	3	3	7	26
d. Type IV	1	2	2	6	8	9	3	31
e. Type V	0	2	2	4	3	2	1	14
Fronto-Nasal Articulation (238):								
a. Pointed	2	0	0	1	0	3	0	6
b. Horizontal	13	12	9	8	7	21	16	86
c. Concave	15	9	13	18	34	27	16	132
d. shaped	3	1	2	1	6	0	1	14
Nasal Profile (226):								
a. Concave	29	13	17	11	23	48	30	171
b. Straight	0	1	1	2	5	1	0	10
c. Concavo-convex	3	6	4	15	13	2	2	45
Nasal Form (233):								
a. Type I	14	15	9	10	15	25	17	105
b. Type II	16	3	12	13	17	24	16	101
c. Type III	2	3	3	5	13	1	0	27
Configuration of lower margin of nasal aperture (240):								
a. Anthropine	6	3	4	8	11	19	7	58
b. Infantile	11	6	0	0	1	7	5	30

Character	Numerical distribution by type							Characters in Total Series
	B1	B11	I 1	I 11	I 111	C1	C11	
c. Prenasalis fossa	11	12	19	20	36	22	21	141
d. Prenasalis groove	4	1	1	0	2	3	0	11
Nasion Depression(241):								
a. Deep	2	4	3	8	15	0	1	33
b. Medium	19	13	18	19	26	29	15	139
c. Slight	12	4	3	1	8	16	16	60
d. None	0	1	0	0	1	6	1	9
Shape of dental arcade (200):								
a. Hyperbolic	0	1	1	2	0	3	6	13
b. Divergent	0	3	5	7	1	15	10	41
c. Semi-elliptical	8	10	8	7	11	14	5	63
d. Elliptical	15	4	5	8	28	15	8	83
Palate height(162):								
a. Shallow	2	4	4	2	5	2	3	22
b. Deep	17	14	15	17	29	30	18	140
Occipital condyles(236):								
a. Type I	14	10	9	16	29	30	22	130
b. Type II	9	4	12	7	12	8	4	56
c. Type III	7	8	3	5	7	13	7	50
Pharyngeal fossa(241):								
a. None	12	10	4	10	8	26	16	86
b. Medium	14	9	11	12	22	19	14	101
c. Deep	7	3	9	6	20	6	3	54

Character	Numerical distribution by type							(Characters in Series
	B1	B11	I 1	I 11	I 111	C1	C11	Total
Glenoid fossa (241):								
a. Shallow	3	2	5	2	7	7	5	31
b. Medium	23	15	13	22	27	38	25	163
d. Deep	7	5	6	4	16	6	3	47
Posterior glenoid Process (235):								
a. Slight	6	1	9	10	17	17	9	69
b. Small	5	4	3	2	13	5	3	35
c. Medium	18	12	10	12	16	21	14	103
d. Large	4	4	1	3	3	7	6	28

The Chi-Square test is applied to the non-metrical characters to test the hypothesis that the seven types of South Asian cranial series comprise a heterogenous population. The following Table XII shows χ^2 test giving a positive result for those non-metrical characters marked + in the table to be significant at .01

It will be seen from Table XII that only a small number of characters do not give a positive result. In these cases, it would be possible to argue that the observed distribution could have been obtained from a single homogenous series of 241 crania. The characters concerned which are therefore without differentiating value are: Metopic Suture, Sagittal Crest, Occipital Condyles, Mastoid Size, Palate Height, Anterior Nasal Spine, Spheno-maxillary Fissure, Glenoid Fossa, External Auditory Meatus. These characters therefore need not be discussed further.

TABLE XXII/

TABLE XII

Character	Degree of Freedom	χ^2	Significance at .01
Cranial Asymmetry	12	36.88	+
Parietal Bosses	12	103.53	+
Headform	30	227.55	+
Frontal Bosses	12	28.45	+
Forehead Height	18	40.84	+
Metopic Suture	24	23.06	-
Brow ridge size	18	62.74	+
Sagittal Crest	6	10.98	-
Parieto-occipital Region contour	18	199.54	+
Ext. Occipital Protuberance	18	102.51	+
Lambdoid Flattening	6	41.96	+
Occipital Torus Size	18	44.08	+
Mastoid Size	12	7.89	-
Ext. Auditory Meatus	12	20.04	-
Temporal Bulge	24	54.90	+
Orbit. Form of Margin	18	60.30	+
Orbit slope	6	24.31	+
Spheno-maxillary fissure	18	33.75	-
Cheek Bones	12	72.93	+
Malar Projection	6	138.48	+
Prognathism	12	45.05	+
Alveolar Prognathism	6	35.73	+
Anterior Nasal Spine	24	27.23	-
Fronto-Nasal Articulation	18	35.76	+
Nasal Profile	12	53.88	+

	Degree of Freedom		Significance at .01
Fronto-Nasal Form	12	36.43	†
Configuration of lower margin of nasal aperture	18	55.70	+
Nasion Depression	18	66.27	+
Shape of Dental Arcade	18	60.95	+
Palate Height	6	3.90	-
Occipital Condyles	12	18.11	-
Pharyngeal Fossa	12	30.17	+
Glenoid Fossa	12	14.41	-
Posterior Glenoid Process	18	47.90	+

Analysis of non-metrical characters:

In order to analyse the incidence of non-metrical characters among the seven types, it has been necessary to tabulate (Table XIII) the distribution of each grade of every non-metrical character serially in all the seven types of South Asian crania and to express these results as a percentage of the total number of crania in each group. The sum of each grade of every character for all the groups is also expressed as a percentage of the total number of crania and therefore gives the distribution in the total South Asian cranial series.

Direct comparison on the basis of the percentages as given in Table XIII is made between the seven types.

Cranial Asymmetry:

Three patterns of distribution can be distinguished. At the one extreme, in types B11 and C1 the three forms occur with approximately equal frequency; there are thus two asymmetric crania to each symmetrical cranium. In types B1, I 1 and I 111, two out of every three crania are symmetrical; in each case normal asymmetry is slightly more frequent than reversed asymmetry. Types I 11 and C11 show an even higher incidence of symmetry, roughly four crania out of every five. There is a distinct

TABLE IXIII

Observations on the South Asian Cranial Series

	Percentage distribution by type							
	B1	B11	I 1	I 11	I 111	C1	C11	Percentage of total series
Cranial Asymmetry:								
Normal	18.2	31.8	20.8	3.6	20.0	31.4	15.2	20.7
Reversed	15.2	36.4	12.5	10.7	14.0	31.4	6.1	18.3
Symmetry	66.7	31.8	66.7	85.7	66.0	37.3	78.8	61.0
Parietal Bosses:								
Foetal	39.4	0	25	46.4	36.0	7.8	45.5	28.6
Infantile	33.3	4.5	33.3	21.4	42.0	2.0	30.3	24.1
Adult	27.3	95.5	41.7	32.1	22.0	90.2	24.2	47.3
Headform:								
Pentagonoid	21.2	0	8.3	46.4	36.0	2.0	21.2	19.9
Eurypentagonoid	18.2	0	16.7	0	0	5.9	24.2	8.7
Ovoid	33.3	4.5	12.5	21.4	40.0	2.0	21.2	20.3
Sphenoid	0	0	20.8	0	2.0	0	9.1	3.7
Ellipsoid	12.1	13.6	8.3	32.1	18.0	2.0	9.1	12.9
Spheroid	15.2	81.8	33.3	0	4.0	88.2	15.2	34.4
Frontal Bosses:								
Foetal	15.2	9.1	25.0	17.9	20.0	11.8	18.2	16.6
Infantile	42.4	50.0	33.3	17.9	24.0	62.7	51.7	41.1
Adult	42.4	40.9	41.7	64.3	56.0	25.5	30.3	42.3
Forehead Height:								
Inclined low	45.5	27.3	25.0	50.0	30.0	37.3	39.4	36.5
Inclined high	15.2	22.7	29.2	0	10.0	33.3	21.2	19.1
Vertical low	21.2	22.7	20.8	25.0	48.0	19.6	33.3	28.6
Vertical high	18.2	27.3	25.0	25.0	12.0	9.8	6.1	15.8

	B1	B11	I 1	I 11	I 111	C1	C11	Percentage of total series
Occipital Torus Size:								
None	54.5	63.6	25	25	56	39.2	33.3	43.2
Small	9.1	22.7	45.2	46.4	18	21.6	12.1	23.2
Medium	30.3	13.6	29.2	28.6	26	31.4	45.5	29.9
Pronounced	6.1	0	0	0	0	7.8	9.1	3.7
Mastoid Size:								
Small	12.9	18.2	12.5	17.9	12.5	9.8	24.2	14.8
Medium	61.3	50	62.5	57.1	66.7	74.5	57.6	63.3
Large	25.8	31.8	25	25	20.8	15.7	18.2	21.9
Ext. Auditory Meatus:								
Round	21.2	22.7	20.8	17.9	26	19.6	18.2	21.2
Elliptical	21.2	13.6	12.5	14.3	6	37.3	27.3	19.9
Oval	57.6	63.6	66.7	67.9	68	43.1	54.5	58.9
Temporal Bulge:								
Flat	9.1	0	0	14.3	2.0	2.0	0	3.7
Slight	24.2	4.5	20.8	35.7	33.3	14.0	15.2	22.0
Moderage	36.4	50.0	54.2	28.6	41.2	32.0	39.4	39.0
Localized prominence	18.2	18.2	8.3	21.4	11.8	8.0	21.2	14.5
Pronounced	12.1	27.3	16.7	0	11.8	44.0	24.2	20.7
Orbit Form of Margin:								
Elliptical	12.1	4.5	8.3	25	24	7.8	6.1	13.3
Oblong	18.2	4.5	45.8	35.7	28	5.9	6.1	19.5
Square	36.4	36.4	16.7	7.1	26	49.0	30.3	30.7
Rhomboid	33.3	54.5	29.2	32.1	22	37.3	57.6	36.5
Orbit Slope:								
Oblique	69.7	90.9	66.7	75	62	86.3	97.0	77.6
Transverse	30.3	9.1	33.3	25	38	13.7	3.0	22.4

	B1	B11	I 1	I 11	I 111	C1	C11	Percentage of total series
Spheno-maxillary fissure:								
Normal	33.3	36.4	21.7	21.4	36.4	31.4	39.4	32.1
Wide	21.2	40.9	52.2	35.7	29.5	27.6	30.3	32.1
Laterally expanded	42.4	18.2	21.7	28.6	25.0	13.7	9.1	22.2
Narrow	3.0	4.5	4.3	14.3	9.1	27.5	21.2	13.7
Cheek Bones:								
Small	12.1	13.6	45.8	60.7	46.9	11.8	6.3	27.6
Medium	48.5	36.4	37.5	28.6	51.0	45.1	59.4	45.2
Large	39.4	50	16.7	10.7	2.0	43.1	34.4	27.2
Malar Projection:								
Laterally	18.2	22.7	83.3	85.7	87.8	5.9	18.8	44.8
Antero-laterally	81.8	77.3	16.7	14.3	12.2	94.1	81.3	55.2
Prognathism:								
Absent	12.1	9.1	8.3	0	0	2	9.1	5.0
Slight	84.8	86.4	83.3	89.3	80	60.8	51.5	74.7
Pronounced	3.0	4.5	8.3	10.7	20	37.3	39.4	20.3
Alveolar Prognathism:								
Absent	78.8	81.8	83.3	53.6	94	51.0	60.6	71.4
Present	21.2	18.2	16.7	46.4	6	49.0	39.4	28.6
Anterior Nasal Spine:								
Type I	29.6	14.3	14.3	7.1	17.4	10.2	12.9	14.3
Type II	59.3	47.6	47.6	46.4	52.2	61.2	51.6	53.4
Type III	7.4	19.0	19.0	10.7	6.5	6.1	22.6	11.7
Type IV	3.7	9.5	9.5	21.4	17.4	18.4	9.7	13.9
Type V	0	9.5	9.5	14.3	6.5	4.1	3.2	6.3

	B1	B11	I 1	I 11	I 111	C1	C11	Percentage of total series
Fronto-Nasal Articulation:								
Pointed	6.1	0	0	3.6	0	5.9	0	2.5
Horizontal	39.4	54.5	37.5	28.6	14.9	41.2	48.5	36.1
Concave	45.5	40.9	54.2	64.3	72.3	52.9	48.5	55.5
∧ shaped	9.1	4.5	8.3	3.6	12.8	0	3.0	5.9
Nasal Profile:								
Concave	90.6	65	77.3	39.3	56.1	94.1	93.9	75.7
Straight	0	5	4.5	7.1	12.2	2.0	0	4.4
Concavo-Convex	9.4	30	18.2	53.6	31.7	3.9	6.3	19.9
Nasal Form:								
Type I	43.8	71.4	37.5	35.7	33.3	50	51.5	45.1
Type II	50.0	14.3	50	46.4	37.8	48	48.5	43.3
Type III	6.3	14.3	12.5	17.9	28.9	2	0	11.6
Configuration of lower Margin of Nasal Aperture:								
a. Anthropine	18.8	13.6	16.7	28.6	22.0	37.3	21.2	24.2
b. Infantile	34.4	27.3	0	0	2.0	13.7	15.2	12.5
c. Prenasalis fossa	34.4	54.5	79.2	71.4	72.0	43.1	63.6	58.8
c. Prenasalis groove	12.5	4.5	4.2	0	4.0	5.9	0	4.6
Nasion Depression:								
Deep	6.1	18.2	12.5	28.6	30.0	0	3.0	13.7
Medium	57.6	59.1	75.0	67.9	52.0	56.9	45.5	57.7
Slight	36.4	18.2	12.5	3.6	16.0	31.4	48.5	24.9
None	0	4.6	0	0	2.0	11.7	3.0	3.7
Shape of Dental Arcade:								
Hyperbolic	0	5.6	5.3	8.3	0	6.4	20.7	6.5
Divergent	0	16.7	26.3	29.2	2.5	31.9	34.5	20.5
Semi-elliptical	34.8	55.6	42.1	29.2	27.5	29.8	17.2	31.5
Elliptical	65.2	22.2	26.3	33.3	70	31.9	27.6	41.5

	B1	B11	I 1	I 11	I 111	C1	C11	Percentage of total series
Metopic Suture:								
Supranasal portion present . . .	0	0	0	3.6	6.0	5.9	3.0	3.3
Bregmatic portion present . . .	0	0	0	0	0	0	0	0
Completely obliterated	100	95.5	91.7	89.3	90.0	88.2	87.9	91.3
Partially obliterated	0	0	0	3.6	4.0	3.9	0	2.1
Completely present	0	4.6	8.3	3.6	0	2.0	9.1	3.3
Browridge Size:								
Type I	42.4	22.7	8.3	7.1	6	35.3	51.5	25.3
Type II	12.1	40.9	50	39.3	40	45.1	30.3	36.9
Type III	27.3	27.3	25	25	32	17.6	12.1	23.7
Type IV	18.2	9.1	16.7	28.6	22	2.0	6.1	14.1
Sagittal Crest:								
Absent	12.1	36.4	25	17.9	26	39.2	21.2	26.1
Present	87.9	63.6	75	82.1	74	60.9	78.8	73.9
Parieto-occipital Region Contour:								
Hemispherical	57.6	0	16.7	28.6	20	9.8	63.6	27.8
Protuberant	36.4	0	12.5	53.6	52	7.8	30.3	29.0
Flattened	3.0	95.5	29.2	7.1	14	78.4	6.1	33.2
Flattened Protuberance . . .	3.0	4.5	16.7	0	4	3.9	0	4.1
Inclined Protuberance	0	0	25	10.7	10	0	0	5.8
Ext. Occipital Protuberance:								
None	0	9.1	16.7	17.9	16	17.6	0	11.6
Sharp edge	0	9.1	29.2	39.3	24	0	0	13.3
Round Tubercle	90.9	63.6	41.7	39.3	60	52.9	78.8	61.4
Hook like	9.1	18.2	12.5	3.6	0	29.4	21.2	13.7
Lambdoid Flattening:								
None	78.8	27.3	75	92.9	94	68.6	75.8	75.9
Present	21.2	72.7	25	7.1	6	31.4	24.2	24.1

	B1	B11	I 1	I 11	I 111	C1	C11	Percentage of total series
Palate Height:								
Shallow	10.5	22.2	21.1	10.5	14.7	6.3	14.3	13.6
Deep	89.5	77.9	79.0	89.5	85.3	93.2	85.7	86.4
Occipital Condyles:								
Type I	46.7	45.5	37.5	57.1	60.4	58.8	66.7	55.1
Type II	30.0	18.2	50.0	25	25	15.7	12.1	23.7
Type III	23.3	36.4	12.5	17.9	14.6	25.5	21.2	21.2
Pharyngeal fossa:								
None	36.4	45.5	16.7	35.7	16	51	48.5	35.7
Medium	42.4	40.9	45.8	42.9	44	37.3	42.4	41.9
Deep	21.2	13.6	37.5	41.4	40	11.8	9.1	22.4
Glenoid fossa:								
Shallow	9.1	9.1	20.8	7.1	14	13.7	15.2	12.9
Medium	69.7	68.2	54.2	78.6	54	74.5	75.8	67.6
Deep	21.2	22.7	25	14.3	32	11.8	9.1	19.5
Posterior Glenoid Process:								
Slight	18.2	4.8	39.1	37.0	34.7	34	28.1	29.4
Small	15.2	19.0	13.0	7.4	26.5	10	9.4	14.9
Medium	54.5	57.1	43.5	44.4	32.7	42	43.8	43.8
Large	12.1	19.0	4.3	11.1	6.1	14	18.8	11.9

difference between these types in the incidence of the symmetric forms. In type I 11 reversed asymmetry preponderates over normal, but in type C11 normal asymmetry is more frequent.

Parietal bosses (Plate No. 33, Vol. 11):

Types B11 and C1 are chiefly differentiated from all the rest, having 90% or more of adult forms. In all the remaining series, there is an approach to equipartition between the three forms. Although the greatest number of individuals presents the foetal form in types B1, I 11 and C11, the infantile in type I 111 and the adult in type I 1, it is not certain that a χ^2 test applied to these series with the exclusion of types B11 and C1 would show a significant departure from homogeneity.

Headform (Plate No. 31 - 32, Vol. 11):

Frassetto has distinguished in primary cranial forms by dividing the foetal, infantile and adult parietal forms into two series on the basis of cranial index, taking a value of 77.5 as the dividing line between long (dolichomorph) and broad (brachymorph) forms. When the seven groups are divided in this way, certain differences between those which are not clearly separable on parietal forms alone emerge.

Types B11 and C1 still stand apart as types having an overwhelming preponderance of a single cranial form, spheroid (i.e. brachymorph with adult parietal

forms). In contrast, types I 11 and I 111 are overwhelmingly dolichomorph, but have no clearly marked preponderance of one single parietal form. Type B1, with almost as many dolichomorph as brachymorph crania shows a slight preponderance of the combined pentagonoid and ovoid forms; type C11 has distinctly fewer ovoids and more eurypentagonoids, the dolichomorph and brachymorph series being almost equal. In type I 11 there are at times as many brachymorphs as dolichomorphs with a preponderance of the combined sphenoid and spheroid forms.

Taking the groups from each region together, certain speculative inferences are possible. The small proportion of dolichomorphs, mainly ellipsoid, in type B11 may be taken as registering the influence of type B1, on an almost purely spheroid basic type; equally, the shift towards brachymorphy and an adult parietal form in type B1 could be ascribed to the influence of type B11, the basic type of type B1 being ovoid if not pentagnoid. Similarly, with types C1 and C11, we may suppose the reciprocal influence of a purely spheroid type on one basically pentagonoid but veering towards eurypentagonoid.

With the Indian groups, the problem is more complex in that three interacting groups are inferred. It is clear that type I 1 has done little to raise the cranial index of types I 11 and I 111, its influence being limited to an

increased proportion of ellipsoid cranial forms. In the type I 1 group itself the eurypentagnoid trend might be ascribed to the influence of type I 11 and the ovoid to type I 111.

Frontal Bosses (Plate No. 33, Vol. 11):

There is a clearly marked contrast between the Chinese series with a preponderance of the infantile grade, and the Indian series types I 11 and I 111 in which the adult grade preponderates. The South East Asian series take up an intermediate position, the infantile and adult grades being almost equally frequent. Type I 1 may be said to be intermediate between the other Indian types and those of South East Asian series. It is further distinguished by having the highest incidence (one in four) of the foetal grade.

Forehead height (Plate No. 35, Vol. 11):

There is clear differentiation between the South East Asian series. Type B1 has a preponderance of inclined low forehead and the other grades occurring approximately with equal frequency; type B11 has equal frequency of inclined and vertical forms of forehead. The Chinese series are similar as far as the inclined low forehead is concerned, but inclined high is next in frequency in type C1, vertical low in type C11. Of the Indian series, type I 11 is distinguished by

having the highest incidence of inclined low forehead; type I 111 has the highest incidence of vertical low forehead. Type I 1 has approximately the same distribution as type B11 with a slightly higher incidence of inclined high forehead.

Browridge size (Plate No. 37, Vol. 11):

In the distribution of the four types there is clear differentiation between the Indian groups and the remainder. In all three Indian groups Type II is the most frequent, Types III and IV less so, and type I much the least frequent of the remainder. Group B11 comes nearest to the Indian series, but shows a higher frequency of Type I and less of Type IV. In group C1 Type II is still the most frequent, but type I has supplanted type III in second place, and in group C11 types I and II have exchanged positions. The remaining group B1 has an anomalous distribution in that type I is most frequent, but both types III and IV are not frequent than type II.

Parieto-occipital contour (Plates No.38 - 39):

The South East Asian series are clearly differentiated. Type B1 has a preponderance of the hemispherical form and in a less degree of the protuberant form while type B11 displays the flattened form almost exclusively. The Chinese series are similarly differentiated, type C1 having

a preponderance of the flattened form, and type C11 of the hemispherical and protuberant forms. The Indian series types I 11 and I 111 have a preponderance of the protuberant form, shading into the hemispherical and thus differ from the South East Asian and Chinese series. The pattern of distribution in type I 1 is very irregular. However, the flattened form shows the highest incidence with the inclined protuberance next in frequency.

Lambdoid Flattening:

The type B11 is distinguished from all the others in having lambdoid flattenint present in three out of every four specimens. At the other extreme, types I 11 and I 111 such flattening is absent in more than 90% of crania. In other types (B1, I 1 and both Chinese series) this feature is present in between 20 and 33%.

External occipital protuberance:

Except in type I 11 the round tubercle form has the highest incidence ~~except in type I 11~~ but this incidence varies from90% in type B1 to 40% in types I 1 and I 11. The hook-like protuberance has an incidence of 20 - 30% in both the Chinese series; of the remainder, only type B11 approaches this Indian series, but is rare or absent in the South East Asian and Chinese. Absence of a distinct external occipital protuberance occurs in 15 - 20% of the Indian and type C1 series, but in only 10% of type B11, and not at all in type B1 and type C11.

Size of occipital torus (Plate No. 40, Vol. 11):

Both South East Asian series show absence of the occipital torus in rather more than 50% of specimens, and in this they agree with types I 111, I 1 and I 11 show the greatest number of small tori, shading off almost equally into the absent and medium grades. Types C1 and C11 show a somewhat erratic distribution, the absent and medium grades being almost equal in frequency and both exceeds the small grade; type B1 also shows a preponderance of medium over small. It is also noteworthy that only these three groups show any examples of a pronounced torus.

Temporal Bulge (Plate No. 42, Vol. 11):

There is a disturbing element in the pattern of variation, due to the condition of localized prominence, this occurs in almost 10% of types I 1, I 111 and C1, but in almost 20% of the other series. Omitting this, it may be said that in types B1, I 1 and I 111 the moderate grade is not frequent until a subsidiary emphasis on the slight grade. In type I 11 slight grade takes first place, moderate grade is next, but the flat grade is more frequent than in any other type. Types B11 and C11 both have moderate grade in first place followed by pronounced grade while in type C1 pronounced grade takes priority over moderate grade.

Orbit. Form of Margin (Plate No. 43, Vol. 11):

In both the South East Asian and Chinese series there is a clear preponderance of the combined square

and rhomboid forms. The rhomboid is the most frequent form in types B11 and C11, and the square in type C1, while in type B1 the two are approximately equal, and elliptical and oblong forms rather more occur than in the other groups. In types I 1 and I 11 it is the combined oblong and rhomboid forms.

Orbit slope:

Although an oblique direction of the orbital breadth axis is most frequent in all series, frequency fluctuates from two out of three cases in types B1, I 1 and I 111, to three out of four in type I 11, and more than four out of five in types B11, C1 and C11.

Cheek bones:

The Indian series with small to medium cheek bones contrast clearly with the South East Asian and Chinese series which have medium to large cheek bones. In the Indian series, small cheek bones are ~~not~~ most frequently found in type I 11, rather less frequently in type I 1; type I 111 has as many medium as small, but very few large. Type B11 has the greatest frequency of large cheekbones; in type C1 large and medium occur equally, while in types B1 and C11 medium cheekbones are most frequent, and occurring most often in type C11.

Malar Projection:

The primary contrast between the Indian groups on the one hand, and the South East Asian and Chinese series on the other, is strongly revealed by this

character than by the proceeding one. In all three Indian types at least four out of every five individuals show laterally projecting malars, whereas in the other series there is an equal predominance of antero-laterally projecting malars.

Prognathism:

Slight prognathism may be considered the rule in all the series. There is however a clearly marked contrast between the Chinese series and the remainder. In both types C1 and C11 pronounced prognathism characterises two out of every five individuals, elsewhere it attains a frequency as high as one in five only in type I 111.

Alveolar Prognathism:

The distribution of this character differs somewhat from that of total prognathism. It is true that both the Chinese series show between 40 and 50% of specimens with alveolar prognathism, but ~~even~~ so also does type I 11. In the other series the proportion showing this feature falls to 20% or less, and in type I 111 to less than 10%

Nasal profile:

A preponderance of the concave nasal profile characterises both the Chinese types and also type B1; in a less degree this profile also predominates in types B11, I 1 and I 111. In types B11 and I 111

about one out of every three specimens has a concavo-convex profile; in type I 11 the concavo-convex profile is found in one out of two individuals, the concave in only two out of five.

Nasal form:

Group B11 is singular in having a clear preponderance of the type I form, whereas group B1 and the two Chinese groups are divided almost equally between type I and type II. The Indian groups are characterised, first by a slight excess of type II over type I, and secondly, by a higher incidence of type III than is found in any other group, except group B11; in group I 111 only does type III attain almost to equality with type I.

Fronto-nasal articulation:

Although four forms are distinguished, it is clear that only the balance between the horizontal and concave fomms is of real significance. Types I 11 and I 111 show a definite preponderance of the concave form, types I 1 and C1 a much less marked inclination in favour of this form. In types B1 and C11 the two forms have an equal incidence, which in type B11 the balance tilts in favour of the horizontal form. It could be claimed that in the Indian series together there is predominance of the concave form, in the South East Asian and Chinese approximately equally incidence of concave and horizontal.

Configuration of the lower margin of nasal aperture:

The Indian series are in effect divided between (Anthropine) and (Prenasalis fossa) forms with approximately three individuals of (Prenasalis fossa) form to one of (Anthropine) form. In types B11 and C11 (Prenasalis fossa) form is still the most frequent, but less markedly in both cases the reduction in numbers of (Prenasalis fossa) form has been to the benefit of (Infantile) form which in type $^{B}11$ has profited further from a reduction in the number of (Anthropine) form.

In type B1 (Infantile) form has attained an incidence equal to that of (Prenasalis fossa) form, while in type $^{C}1$ it is (Anthropine) form and (Prenasalis fossa) form which have approximately equal frequency.

Nasion Depression:

A medium degree of depression is most usual except in type C11, where medium and slight degree occur with almost equal frequency. It is however clear that in both Chinese groups and in type $^{B}1$ the trend of variation is from medium to slight or even absent, where as in types I 1 and I 111 it is towards a deep depression. In types $^{B}11$ and I 1 there is clearly marked trend in either direction.

Shape of dental arcade (Plate No. 45, Vol. 11):

Types $^{B}1$ and I 111 are divided between the elliptical and semi-elliptical forms with a clear preponderance of the former. In types $^{B}11$ and I 1 there is a slight preponderance of the semi-

elliptical form, with equal trends towards the elliptical and divergent. Types I 11 and C1 have all three of these forms occuring in equal frequency. In type C11 the divergent form slightly outweighs the elliptical. There is a falling off in the numbers of the semi-elliptical form, and a much higher incidence of the hyperbolic form than in any other group.

Pharyngeal fossa:

A medium or deep fossa is present in more than four individuals out of five in types I 1 and I 111, and in two out of three in types B1 and I 11. In types B11, C1 and C11, absence of the fossa is almost as common as its presence.

Posterior Glenoid process:

Some pattern in this distribution becomes apparent if the slight and small grades are taken together in contrast to the combined medium and large grades. In the South East Asian series, the latter combination would account for at least two out of every three individuals, in the Chinese series and in type I 11 for rather more than one in two, for one in two in type I 1 and for only one in three in type I 111.

The Characteristic morphological features of the seven types:

The South East Asian type B1:

It will be seen from Table I that the type B1 is composed almost equally of continental (Burmese and Siamese) and Indonesian (Malayan and Borneais) crania. As a group it is characterized by the following morphological features. The cranium is symmetrical in about 66 per cent of the specimens; the foetal and infantile forms of parietal bosses, associated with pentagnoid and ovoid headforms, occur in about 72% of the specimens. The forehead is usually low and is usually inclined, with frontal bosses of infantile or adult form. The brow ridges may be either of type I or of types III - IV. Lambdoid flattening is characteristically absent. The curve of the parieto-occipital region is hemispherical and the round tubercle form of external occipital protuberance has the highest incidence in this group. The occipital torus is most often absent or small. The temporal region shows a slight or moderate bulge. The outline of the orbital opening (margin) is square or rhomboid in shape, and its breadth axis is oblique in direction. The cheek bones are of medium to large size and project antero-laterally. In lateral view the face shows slight total prognathism but no alveolar prognathism. The nose is moderately recessed at

nasion, and has a concave profile, Type I and type II forms of nasal bones are equally represented, and similarly the horizontal and concave forms of fronto-nasal articulation are equally present in this type. The infantile form of the lower margin of nasal aperture has an incidence equal to that of the prenasalis fossa form. The dental arcade is predominately elliptical. The pharyngeal fossa is absent or of medium depth. The posterior glenoid process is most frequently of medium size.

South East Asian Type B11:

This group is composed almost entirely of continental (Burmese and Siamese) crania, and has the following characteristics. Cranial asymmetry is the rule, the normal andreversed patterns being equally frequent. The adult form of parietal bosses associated with the spheroid headform predominates. The forehead is with equal frequency low or high, and inclined or vertical with frontal bosses of infantile or adult form. The browridges are most often of type II, shading equally into types I and III. Lambdoid flattening is usual; the parieto-occipital region is almost invariably flat, and the external occipital protuberance most often has the form of a round tubercle. The occipital torus is usually absent. The temporal region shows a moderate or

pronounced bulge. The orbital opening is rhomboid or square in outline, and its breadth axis is oblique in direction. The cheek bones are of large or medium size and project antero-laterally. In lateral view the face shows slight total prognathism but no alveolar prognathism. The nose moderately recessed at nasion has a concave or cancavo-convex profile. In form the nasal bones are characteristically of type I, and the fronto-nasal articulation is horizontal or concave. The prenasalis fossa form of the lower margin of nasal aperture is most frequent. The dental arcade is preponderantly of the semi-elliptical form. The pharyngeal fossa is absent or of medium depth. The posterior glenoid process is most frequently of medium size.

Indian type I 1:

As in type B1 the symmetrical form of cranium is found in 66 per cent of the specimens. The parietal bosses are most frequently adult or infantile associated with a spheroid or sphenoid cranial form. The forehead is with equal frequency low or high, and vertical or inclined; foetal as well as infantile and adult frontal bosses occur with some frequency. The browridges are most often of type II. Lambdoid flattening is usually present. The parieto-occipital region is most often protuberant.

The external occipital protuberance is either a round tubercle or a sharp edge. A small or medium sized occipital torus is usually present. The temporal region most often shows a moderate bulge. The orbital margin is oblong or less frequently rhomboid in shape, and the breadth axis is usually oblique. The cheek bones are of small or medium size and project laterally. In side view the face shows slight total prognathism with absence of alveolar prognathism. The nasal bones are moderately recessed at nasion and concave in profile, and in form they belong to Type II or Type I, and have the concave or horizontal form of fronto-nasal articulation. The lower margin of the nasal aperture shows a high incidence for prenasalis fossa. The dental arcade is most often semi-elliptical. There is usually a medium or deep pharyngeal fossa, and a slight or medium sized posterior glenoid process.

Indian type II:

The incidence of symmetrical form is highest in this group. The frequency of foetal parietal bosses associated with pentagnoid headform is also high; adult bosses and ellipsoid headform are more frequent than infantile bosses and ovoid headform. The forehead is low, inclined or vertical, with adult

frontal bosses, and browridges of type II, III or IV. Lambdoid flattening is most invariably absent. The parieto-occipital region is protuberant; sharp edge and round tubercle forms of external occipital protuberance are equally frequent. A small occipital torus is found in about 46 per cent of specimens. The temporal region usually shows a slight or moderate bulge but flatness of this region is more frequent than in any other group. The orbital outline is either oblong or rhomboid, and its breadth axis oblique in direction. The cheek bones are characteristically small and laterally projecting. Slight total prognathism is the rule; alveolar prognathism occurs in almost half of the series. The nose is moderately recessed at nasion and has a concavo-convex or concave profile with type II or type I form of the nasal bones, and concave form of fronto-nasal articulation. As in Indian type I 1, a prenasalis fossa is usual. The divergent, semi-elliptical and elliptical forms of dental arcade occurs with equal frequency. The pharyngeal fossa is usually of medium depth, but may be absent. The posterior glenoid process is most often of medium size.

Indian type I 111:

A symmetrical cranium is found in about 66 per cent of the specimens. Infantile and foetal parietal bosses are associated with ovoid or pentagonoid headforms. The forehead is low, and usually vertical, the frontal bosses is most often adult, and the browridges are of type II or type III. Lambdoid flattening is almost constantly absent. The parieto-occipital region is protuberant, and the external occipital protuberance usually is round tubercle. There is usually no occipital torus. The temporal region most often has a moderate or slight bulge. The four forms of orbital outline occur nearly equally. The orbital breadth axis is usually oblique. The cheek bones are of small or medium size and project laterally. There is almost always slight total prognathism, but alveolar prognathism is very rarely present. The nasal bones are moderately recessed at nasion and concave or concavo-convex in profile with nasal bones of type II or type I, and a concave form of fronto-nasal articulation. The lower margin of the nasal aperture usually shows the prenasalis fossa. The elliptical form of dental arcade preponderates. There is almost always a medium to deep pharyngeal foasa, and a slight or medium sized posterior glenoid process.

Chinese type C1:

Cranial asymmetry either normal or reversed is more frequent than symmetry. The adult form of parietal bosses associated spheroid headform occurs predominately. The forehead is usually inclined, more often low than high, with infantile frontal bosses, and brow ridges of type II or type I. There is usually no lambdoid flattening, but the parieto-occipital region as a whole is flat. The external occipital protuberance is usually a round tubercle. The size of the occipital torus is very variable. The temporal region shows a pronounced or at least moderate bulge. The orbital opening is usually square or rhomboid and its breadth axis oblique. Medium and large cheek bones occur with nearly equal frequency and project antero-laterally. There is almost always some total prognathism which may be pronounced and alveolar prognathism is present in almost 50% of the series. The nasal bones are moderately recessed at nasion and almost invariably concave in profile, with type I and type II forms of nasal bone in almost equal proportions, and concave or horizontal fronto-nasal articulation. The lower margin of the nasal aperture may have a prenasalis fossa or may be of the anthropine type. The divergent, semi-elliptical and elliptical forms of dental arcade occur with approximately equal frequency. Absence of the pharyngeal fossa and a slight or medium

sized posterior glenoid process are most frequent.

Chinese type C11:

The symmetrical form of cranium is found in about 75 per cent of the specimens. Foetal or infantile parietal bosses are associated with eury-pentagnoid, pentagonoid, or ovoid headform. The forehead is usually low and inclined, the frontal bosses more often infantile than adult, and the browridges of type I or type II. Lambdoid flattening is usually absent. The parieto-occipital region is most frequently hemispherical, the external occipital protuberance is a round tubercle, and there is often a medium or even pronounced occipital torus. The temporal region has a moderate or pronounced bulge. The orbital opening is rhomboid or square, and its breadth axis is consistently oblique. The cheek bones are of medium or large size and project antero-laterally. Slight or pronounced general prognathism is the rule, but alveolar prognathism is less often present than absent. The nasal bones are slightly recessed at nasion and almost always concave in profile with nearly equal proportion of type I and type II forms of nasal bone. Similarly horizontal and concave forms of fronto-nasal articulation are equally frequent in this group. The lower margin of the nasal aperture usually shows a prenasalis fossa. The divergent and elliptical

forms of dental arcade are most frequent. The pharyngeal fossa may be absent or of medium size. A medium sized posterior glenoid process is most frequent.

Small Cranial series:

~~It is composed of the following:~~

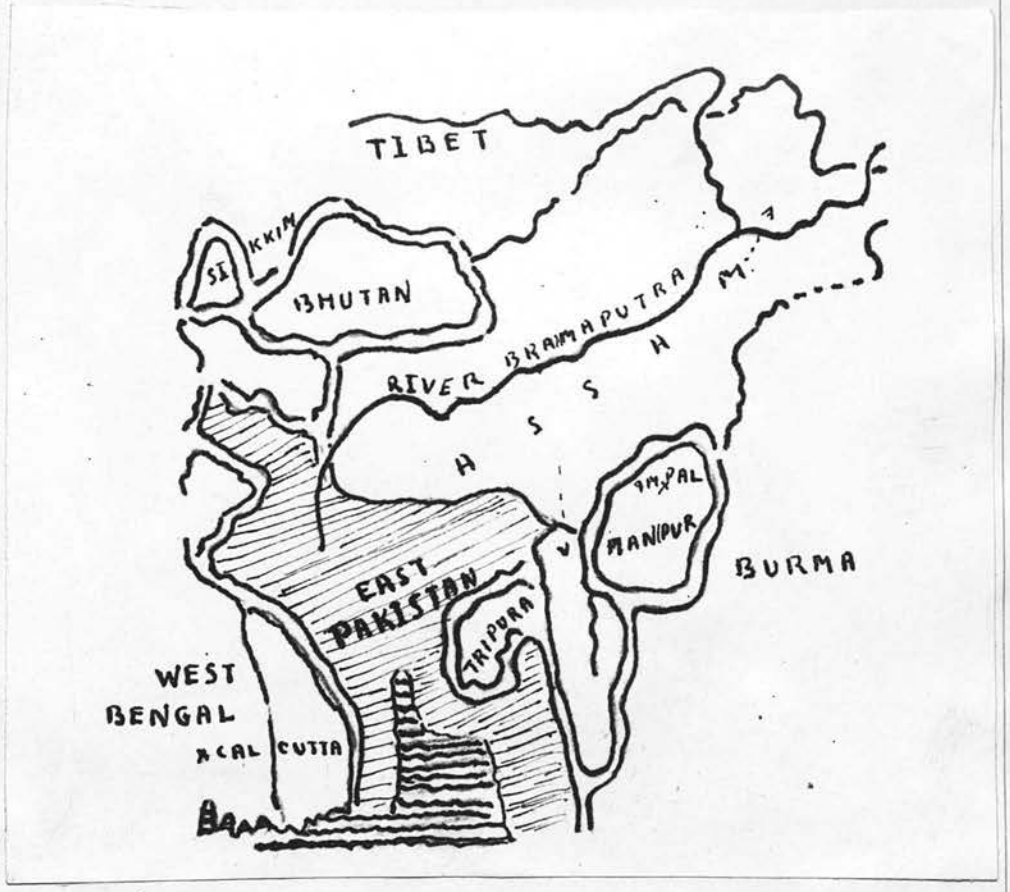
1. Naga
2. Veddah
3. Sakai
4. Tibetan
5. South Indian.

Naga: There are 19 male Naga crania procured from North-East India recorded in the cranial catalogue of the Anatomical museum, University of Edinburgh. The study of this group is important due to the unique geographical position occupied by North-East India between China, Tibet, Burma and the remainder of the Indian Continent (Plate No. 1. Vol. II). Morant (1923) in his paper on 'A first study of the Tibetan Skull' says, "It may be followed by papers dealing with the material from the Himalayan border lands and Eastern China. These people are of peculiar interest because the country which they inhabit is a border land between Mongolian and Indian races; and in prehistoric and early times was probably traversed by nomadic tribes in their wandering."

Hence, for their proper assessment, the Naga crania require a study of North-East India,

so as to define the actual geographical abode of these tribes. This is now more necessary because of the partition of India and Pakistan, and a comprehensive knowledge of the area is essential for this study.

North-East India covers an area of little over 250,000 square miles (1954). Its southern shores are washed by the Bay of Bengal, which provides an easy access to the whole of the Ganges valley by sea. Its northern borders are flanked by Eastern Himalayas which are clothed with dense vegetation, and are rather difficult to penetrate except at one or two points. It comprises four part 'A' states - Bihar, Orissa, West Bengal and Assam and two Part 'C' states - Manipur and Tripura. The Himalayan state of Sikkim also forms part of this region. This part of India has a common land frontier with East Pakistan, Burma and China including Tibet. A part of the international frontier separating Nepal from India also lies in this region, and in fact practically the only outlet from Nepal is through Bihar. Bhutan, another Himalayan state, lies just north of the Assam valley, and though politically not a part of North-East India has many common ties with it. Text Fig. 1. (page 100) is a map of North East India.



Turner (1899) who collected extensive information about this area says, "In entering on the consideration of the savage and barbarous tribes who inhabit the wide range of mountainous country which lies south and east of the river Brahmaputra and Assam on the one hand, and north and west of Burma on the other, we are confronted by differences in the nomenclature employed by those who have explored this extensive region,

and have written descriptions of its inhabitants." Goddon (1897) says, "The wild hill tracts which till recent years formed the North-Eastern frontier of the Indian Empire are still to some extent an almost unknown land. A dividing barrier between the plains of Assam on the one hand, and of Upper Burma on the other, these Naga Hills were long known as the abode of fierce and intractable tribes, living in a state of incessant inter-tribal warfare, and asserting their presence on our border by savage raids ...."

The Imperial Gazetteer of India (1908) gives a comprehensive account of the Naga Hills and Naga tribes which is as follows. "Naga Hills is a district in Eastern Bengal and Assam lying between $24^{\circ}42'$ and $26^{\circ}48'$ on the North and between $93^{\circ}7'$ and $94^{\circ}50'$ on the East. It has an area of 3070 square miles. It is bounded on the north by Nowgang and Sibsagar; on the west by the north Cachar Hills; on the south by the state of Manipur and on the east by a line which follows for the most part the course of the Dikko and Tizu rivers, beyond which lie hills inhabited by independent tribes. The district consists of a big narrow strip of hilly country. The Barail range enters it from the west and the Japvo peek

a little to the south of Kohima attains a height of 10,000 feet . . . . . The term Naga is applied by the Assamese to a number of different tribes, the majority having as yet made little progress on the path of civilization, who occupy the hills between the Brahamputra valley and Burma on the north and south, the Jaintia hills on the west and the country inhabited by the Khamtis and Singphos on the east."

The Himalayan ranges and spurs cover a large area in the extreme east of North-East India in the state of Assam. West Bengal includes just a fringe of the Himalayas in the Darjeeling district. Unlike the Darjeeling Himalaya, the Assam Himalaya is inhabited by tribal peoples who have given their names to the particular sections they live in. For example, the Mishmi Hills lie in the upper reaches of the Dihang, a tributary of the Brahmaputra river, and are inhabited by Mishmis. To the south of the Assam Himalayas lies another rugged mountainous tract including the Naga Hills which are much more inaccessible than the Naga districts proper. To one approaching the Naga district from the north, the Barail range has to be crossed by the Kohima road, which runs south to Imphal,

capital of Manipur. To the south of the Naga Hills extend the Lushi Hills, and the Chin Hill tracts lie to the east of the Lushi Hills in Upper Burma. The tribes inhabiting these regions are known as Nagas, Lushi Hillmen and Chins. A local estimate of the population of Part 'C' Tribal areas of Assam is 560, 631 persons (1951).

The Naga crania in the Edinburgh collection from North-East India have been divided into five groups on the basis of their morphological features, and approaches in similarity to other studied groups of the total pooled series of male South Asian crania . Group I comprises three crania which have features resembling the Indian Type I 11 (Plate No. 25 Vol. II). Figs. 3 & 4. Group II consists of eight crania which resemble Indian Type I 111 (Plate No. 25 Vol. II). Figs. 3 & 4. The third and fourth Groups, each consisting of two crania, are in many ways similar to the Chinese groups Type C1 and Type C11 (Plate No. 26 Vol. II). Figs. 5, 6, 7 & 8. The fifth Group, four crania is similar to the Burmese Type B1.

Veddah: This is the second small series consisting of five crania. One approaches in

its morphological features to Indian Type I 11 as shown in Plate No. 28 Vol. II. Figs. 11 & 12 The remaining four crania have a combination of features very different from the Indian types (Plate No. 28 Fig. 13 Vol. II).

Sakai: This is the third small series, composed of four Sakai crania. The brain case is similar to Indian type I 11, but the face shows in its various features some suggestion of a combination of Burmese and Chinese characters (Plate No. 29 Vol. II). Figs. No. 17, 18, 14, 15 & 16.

Tibetan: This is the fourth small series consisting of four Tibetan crania. These crania are similar to Chinese type II (Plate No. 30 Vol. II). Figs. No. 19, 20.

South Indian: This is the last of the small series, composed of four South Indian crania. This group presents quite different features from those of the rest of the Indian series. It has a negroid aspect as shown in Plate No. 30 Vol. II Fig. No. 21 & 22. where a photograph of one of these crania is placed beside that of a Negro cranium from South Africa. This peculiar combination of features can be accounted for by an infusion of either Veddah or Sakai elements into the South Indian type. It is therefore not necessary to postulate a hypothetical Negro intrusion into southern India.

Result:

The South Asian Cranial series in this study is split into three groups corresponding to the three primary areas recognized by Woo and Morant as stated above. They are:-

1. South East Asian group
2. Indian Group
3. Chinese group

and seven types have been recognized among them. In the South East Asian and Chinese groups, the differentiation is achieved as a result of difference in the proportions between both of the brain case and of the face. The three Indian types are differentiated from each other by variation in the proportions of the brain case, but they have much more homogenous facial features than either of the other two groups.

The small cranial series fall into five groups four of which (Naga, Veddah, Sakai and Tibetan) have individual features to some extent similar to one or other of the types of South Asian crania; the fifth (South Indian) showing peculiarities of its own as pointed out above.

Type specimens:

In this study it has been thought best to represent each type by an actual specimen of approximately average character, rather than by a synthetic composite as has been done by Angel (1944). Accordingly, the following crania are considered to be type specimens, the catalogue numbers given being those of the University of Edinburgh, Anatomy Department cranial catalogue.

Plate No. 5, 9, 13, 17, 21. Vol. II	$XXIK_{16}$	type B1	South East Asian group
	$XXIK_{19}$	type B11	
Plate No. 7, 11, 15, 19, 23. Vol. II	$XXIG_{22}$	type I 11	Indian group
	$XXID_{1}$	type I 1	
Plate No. 6, 10, 14, 18, 22. Vol. II	$XXID_{49}$	type I 111	Indian group
Plate No. 8, 12, 16, 20, 24. Vol. II	$XXIVB_{76}$	type C1	Chinese group
	$XXIVB_{19}$	type C11	
Plate No. 25.	Vol. II	$XXIF_{24}$	Naga group I
Plate No. 25.	Vol. II	$XXIF_{11}$	Naga group II
Plate No. 26.	Vol. II	$XXIF_{25}$	Naga group III — Naga series
Plate No. 26.	Vol. II	$XXIF_{12}$	Naga group IV
Plate No. 27.	Vol. II	$XXIF_{14}$	Naga group V
Plate No. 28.	Vol. II	$XXIH_{5}$	Veddah
Plate No. 28.	Vol. II	$XXIH_{2}$	Veddah
Plate No. 29.	Vol. II	$XXIIC_{18}$	Sakai
Plate No. 30.	Vol. II	$XXIVA_{3}$	Tibetan
Plate No. 30.	Vol. II	$XXID_{69}$	South Indian

DISCUSSION

Keith (1916) says, 'Without doubt many of the races found in India, Further India, and in Oceania have been produced by the blending of two or more distinct stocks.' Hooton (1925) has pointed out that in any given series of hybrid origin: 'One ought to be able to show that the 'mixed' types are the indubitable result of a certain combination of features inherited from the 'pure' types represent segregations of certain features found in the mixed types.'

The general tendency to retain 'racial purity' is constantly offset to some extent by admixture of races leading to the development or decomposition of racial types and varieties; a feature which must be taken into account at this stage as the subsequent considerations will be viewed from this angle. According to Steele (quoted by Briggs, 1955), 'Uniformity of individuals within a group is indicative of genetic homogeneity',

but Howell (1936) using Shapiro's data on the Norfolk Islanders, has shown that a demonstrably hybrid group can be more uniform than either of its parent stocks, and Hooton (1925) has suggested 'That homogeneity is quite possibly obtained by a long continued pan-mixture of very diverse racial elements.' Briggs (1955) states that Coon, Garn and Birdsell (1950) have pointed out succinctly that emigrant groups which once formed part of a single homogenous population, but have moved away and settled in different areas, tend to develop distinctive hereditary differences in their new and different habitats, whereas immigrant groups, descended from different stocks and coming from widely separated places into a single area where they have joined to form a united population, tend to blend progressively into a homogenous whole under the combined influence of inbreeding and common ecology, social structure and environment, in general.

It is apparent that the present study involves dealing with a constellation of groups

which severally at least and very likely as a whole were subjected to those levelling influences that Coon, Garn and Birdsell postulate as the active agents of racial homogeneity.

The validity of the types distinguished in this study has been sufficiently established both metrically and morphologically. The presence of two or more such types within each region can be accounted for in either of two ways. Most simply, it may be assumed that these types represent the parent stocks postulated by Keith (1916) with their distinctive characters only partially blurred by interbreeding. Alternatively, it can be argued that the original stocks are so completely blended as to be no longer recoverable; the observed types would then be secondary segregates produced by geographical or social isolating forces within the composite population.

Comparison with the results of other authors:

Before the present South Asian series are compared with the available data from the same and the neighbouring regions, it is essential to consider the exact areas from which the material for the present study has been obtained and the relation of these areas to surrounding countries.

South East Asia:

South East Asia lies between India and China (Cressey 1952). The realm includes two distinct geographic provinces: peninsular Further India and the insular lands of the East Indies. The

northern part of the realm in Burma includes Shan states, Siam (Thailand) and Indo-China. The South East consists of peninsular Siam and Malaya plus Indonesia and Borneo is included as the most peripheral portion of this group in the present study.

Burma occupies an intermediate position linking the primary area of the Indian Peninsula ~~and with~~ Ceylon (as stated above), with ~~the~~ South East Asia (Burma to Borneo). This demands proper consideration of the inhabitants and geographical status of Burma.

The inhabitants of Burma consist in the main of the people termed Burmese (called Burman by Tildesley 1920-21), but intermingled with them are representatives, sometimes in considerable numbers, of other tribes and races. Turner (1899) says, 'The Burmese proper are in all probability of the same stock as the Himalayan-Tibetan people, an offshoot of which race migrated, it is believed, in a south-easterly direction until they reach Burma. How far the country was populated by aborigines prior to, and at the time of invasion, it is impossible to say.' He further says, 'It is, however, thought that the district forming the delta of the Irrawady was occupied by a people named Mons or Talainga

whose descendants remain more or less comingled with the Tibeto-Burmese stock.'

Partly on the confines of and partly within the Burmese territory are other races which in their respective districts modify the population. To the north-ward are Manipur and Naga hills, to north west the Lushai - Chin hill ranges, to the east of Lower Burma are the Karens constituting an important element in the population and to the east are the Shan states divided into two parts by the River Salween. In reference to the Shan States Buxton (1925) says, 'It forms the connecting link between Yunnan and Lower Burma.' Turner (1899) gives the description of the inhabitants of Shan States and says, 'As a rule the Shans are civilized, and it is obvious that the Mongolian cast of features is the prevailing type. They have Chinese affinities in both physical character and language, and it seems probably that they have migrated from Western China.'

The Chinese civilization passed from the Shan States directly into Siam which extends south into the Malay peninsula and therefore forms a link not only with China but also with Malaysia. 'There is only one road through it, the valley of the Menam, which appears to have formed the path for racial migration. And to the east of

Siam and the Shan States lies the true peninsula country stated above.' (Buxton 1925).

In the Malay peninsula the greater part of the country consists of wild and untamed jungle. Amongst the inhabitants of the Malay Peninsula Annandale and Robinson (1903) state that it is possible to distinguish two distinct types. They are Sakai and Semang tribes. Besides this, there are the coast folk of Trang, the Malays of Perak, and the Malays and Siamese of Patani and Senggora.

The last country is Borneo which has been well described by Bonin (1931).

Harrower (1928) states, 'Reliable comparative material is unfortunately scarce.' However, the material used in the present study consists of several crania from each of the South East Asian countries as described above. (Table I.)

South East Asian cranial series.

Turner (1899) gives a documented account of 37 male Burmese crania which were received by him from reliable sources. Some, but not all, of these specimens are included in the present study. Table XIV gives the mean values for the principal measurements and indices in Turner's series and in types B1 and B11.

TABLE XIV.

Character	Type B1	Type B11	Turner's Burmese Series
Length	177.04	168.64	172.8
Breadth	134.52	137.91	141.7
Cephalic Index	75.55	81.46	82.1
Basi-Bregmatic height	134.76	133.77	135.1
Length-height index	75.67	78.91	78.2
Byzygomatic breadth	132.03	132.32	133.7
Minimum frontal breadth	93.21	92.09	93.1
Upper facial index	51.06	51.68	52
Nasal index	48.09	48.23	48.6
Orbital index	82.21	83.05	85.0

Inspection of Table XIV shows that the cranial length measurement of Turner's series falls almost midway between those of Types B1 and B11. This would suggest that Turner's series included representatives of both these types. The cranial breadth measurement, however, is strikingly higher in Turner's series. This cannot well be explained by a difference in the technique of measurement. It might be that the part of Turner's series not available for this study consisted of exceptionally broad skulls. Alternatively, the non-Burmese samples of Types B1 and B11 may be supposed to be narrower than the

Burmese. In the other measurements considered the differences are too small for any significance to be attached to them.

Tildesley (1920-21) examined 142 skulls of which her three male groups A, B and C are taken into account here. She gives no reliable documentation regarding the source, sex etc. of skulls, as Turner does for his Burmese series. She says, 'The collection of skulls which forms the subject of the present study was procured from the neighbourhood of Moulmein in the southern part of Burma.' She states further that, 'The territory which stretches from the Namkin mountains in the north down the whole length of the Irrawady river, and still further down the coast towards the Malay peninsula, and is administered under the name Burma, embraces many racial units which might be classed together generally as Burmese, but of which the Burman proper is only one. The request was for purely Burman skulls, but it was evidently difficult to ensure this, and the collection of 142 skulls includes some that are of a different racial type from the majority.' Table XV gives the mean value of the characters of Tildesley's A, B and C male Burmese series and for comparison with these, the figures for the same characters for types B1 and B11 (South East Asian) of this series.

TABLE XV.

Character	Type B1	Type B11	Tildesley's Burmese Series		
			A	B	C
C.L.	177.04	168.64	173.5	173.8	176.7
C.B.	134.52	137.91	143.7	141.1	140.4
C.I.	75.55	81.46	82.9	80.4	79.5
B.B.H.	134.76	133.77	136.0	134.7	139.1
L.H.I.	75.67	78.91	78.5	76.7	73.9
B.B.	132.03	132.32	134.0	131.7	126.7
M.F.B.	93.21	92.09	94.3	89.7	90.7
U.F.I.	51.06	51.68	-	-	-
N.I.	48.09	48.23	52.7	51.0	46.3
O.I.	82.21	83.05	-	-	-

Table XV shows that in the characters listed Tildesley's series A and B differ but little from each other (or from Turner's series). Again, the one noteworthy point of difference between these series and types B1 and B11 lies in the cranial breadth. Tildesley's series C, on the other hand, is sharply set apart by its longer and higher braincase and narrower face and nose. These characters suggest a comparison between Tildesley's series C and the Indian types.

Table XVI shows the mean values given by Bonin (1931) for the characters of male crania from

Borneo, Java (Bantam and Batavia), and a third series containing crania from various parts of Java, compared with those of the South East Asian types.

TABLE XVI.

Character	Type Bl	Type Bll	Borneo (D)	Java (B & B)	Java
C.L.	177.04	168.64	176.6	169.9	173.7
C.B.	134.52	137.91	138.2	140.8	142.2
C.I.	75.55	81.46	78.4	83.0	82.0
B.B.H.	134.76	133.77	134.8	134.4	135.5
L.H.I.	75.67	78.91	76.5	79.2	78.1
B.B.	132.03	133.32	132.9	132.0	134.7
M.F.B.	93.21	92.09	93.3	90.8	93.1
U.F.I.	51.06	51.68	-	-	-
N.I.	78.09	48.23	51.4	51.0	51.0
O.I.	82.21	83.05	80.4	80.9	80.8

An inspection of Table XVI shows that Type Bl and the Borneo series are very similar in the mean values of their characters, except that the Borneo skulls are somewhat broader; the difference is however less than in the case of the South east Asian series. Type Bll, while differing from the Borneo series, is similar to the first Java series (Bantam and Batavia). The second Java series has larger

braincase characters than the first, but its indices are very close to those of B11.

It will be seen from Table I that group B1 includes both Continental and Indonesian (principally Bornean) crania, whereas group B11 is almost entirely Continental series. There are however no Javanese specimens in our series. However, there is nothing inherently improbable in the suggestion that the Bornean population conforms essentially to our type B1 and the Javanese to our type B11, while on the mainland these two types exist side by side.

Turner (1907) examined few Malayan skulls and says, 'Several specimens are indeed marked Malay without any further information.' Tildesley in describing her Malayan series says, 'The skulls of the Malayan series have been assembled from the various islands of the Malay Archipelago, which we are aware contain a considerable Indonesian element.' She further points out, 'There can be equally little doubt, however, that by 'Malay' is not meant the pure Malay race, but any of the kindred races scattered upon those islands which are now more usually grouped under the broader term Malayan.' A comparison is made between the larger Malayan series of Tildesley and type B1 and type B11 in Table XVII.

TABLE XVII/

TABLE XVII.

Character	Type B1	Type B11	Malayan series
C.L.	177.04	168.64	174.7(78)
C.B.	134.52	137.91	142.2(77)
C.I.	75.55	81.46	81.7(77)
B.B.H.	134.76	133.77	137.4(76)
L.H.I.	75.57	78.91	-
M.F.B.	93.21	92.09	93.4(72)
U.F.H.	68.09	69.55	70.1(73)
B.B.	132.03	133.32	133.2(75)
U.F.I.	51.06	51.68	52.6
L.O.I.	82.21	83.05	86.0
N.I.	48.09	48.23	50.4

Table XVII shows that the dimensions of the braincase - cranial length, cranial breadth and basi-bregmatic height are markedly larger in the Malayan series, but the cranial index is almost the same as that of Type B11. In size of braincase, this Malayan series corresponds very closely with Bonin's second Javanese series (Table XVI).

The Indian Peninsula with Ceylon:

The people of India are not just a collection of individuals, but a mass of corporate entities, whose numbers, names, characters and functions are infinitely diverse. In spite of a general

resemblance of all these entities both on the practices they observe and in the mechanism by which each is maintained as a separate unit, all these entities are vastly different. These entities which form the invariable and necessary framework of the most complex form of organization in India, passing under the name of the Caste system, are the ultimate units of importance for anthropological study. An attempt will be made here to describe one of the essential features common to all these hereditary entities, namely one of the laws governing their marriages. This law has a twofold aspect. It permits an individual to marry within his own entity and forbids him to marry with a narrower section inside the entity. These exogamous sections vary widely in their limits, titles and definition. The enforcement of this law is carried out essentially by custom, an authority both tenacious and capricious yet very powerful in its immediate action. However, it is essential to point out that in recent times intermarriage between different groups and even between Indian and non-Indian individuals has begun to take place; but the percentage of such marriage is so low that it will not affect the vast population of India for a long time.

Inhabitants of India: Out of a total population of 356,891,624 (Indian Census 1951) approximately 75.9% are Hindus, 13.8% Moslems, 6.6% Tribes and the remaining 3.7% of the population is divided among Christians, Sikhs, Jains, Buddhists, Parsees and Jews.

Hindus are the most numerous inhabitants of India. Two features which are common to all Hindus are (1) religious allegiance to Vedas and (2)the Caste system. Vedas are the ancient Indian scriptures in Sanskrit language.

Whatever little evidence is available shows clearly that the most diverse forms of racial elements have entered into the composition of these Hindus. Archaeological excavations of Mohenjo-Daro and Harappa have shown that there existed a civilization now known as the 'Indus Civilization' which flourished round about 3000 B.C. Linguistic evidence is available to show that there were groups of people indigenous to India and now known as 'Dravidians' who probably had intercourse with the people of 'Indus Civilization'. The most important groups of people are, however, the 'Aryans' who came in large numbers, century after century, in successive waves of immigration. In addition there are described invasions of a number of nomadic tribes like Sakas (or Scythians) and Huns, for some centuries before and after

Christ. At the same time, aborigines throughout India have been absorbed into Hinduism from its earliest stages to the present day. The aborigines are the earliest known inhabitants of India, and are classified by census authorities as tribes, living mostly in remote forests and fastness of the hills. These various elements go under the all-embracing title of 'Hindus'. An obscure but important question is, at what stage did the process of endogamy originate to keep these elements biologically diverse? The germ of this process is seen in a later hymn of the earliest Veddah, the Rigveda; but it is difficult to decide whether it was only theoretical or practical.

Moslems form less than about one seventh of the population of India. A small portion of it consists of descendants of immigrants, who came to India as Muhammadans from the eighth century onwards, while a vast majority of it are converted Hindus, who either joined Islam from conviction in response to the teaching of missionaries or responded to the pressure applied by zealous Moslem rulers. The institution of caste existing at the time of their entry into India has penetrated the religious barrier of Islam. This can be seen by the following

three well-defined groups among its fold:-

(1) descendants of Muhammadan immigrants,

(2) Hindu converts marrying freely with other Moslems, and

(3) Hindu converts retaining their former prohibition of marrying outside the caste.

Out of the remaining communities an account of Parsees and Indian Christians are of interest.

Parsees are the descendants of the people who fled from Persia after the fall of the Zoroastrian Sassanian Empire in A.D. 651. After wandering about for nearly a hundred years they were permitted to settle down on the west coast of India. It is not known whether they brought women with them or took them from the neighbouring people in India; but after that time they do not seem to have had any matrimonial relations with other people in India. They number 114,890 residing mainly on the west coast.

Indian Christians: Christian missions have been active, particularly in southern India, from the beginning of the sixteenth century, and the Christian population is largely, though not entirely, composed of converts from the poorer classes, who were resentful of their social position in the Hindu community. They number

6,040,665. Religious barrier here also has been cut across, giving castes like 'Brahman Christian' and 'Sundra Christian'.

The population of Ceylon bears a close relationship to that of southern India of which the island is really a disconnected part.

'Ceylon was originally a portion of India, and the earliest inhabitants of both the island and southern India could not have been materially different. Our island is just mentioned in the 'Mahabharat', but it is the scene of many an exciting incident in the 'Ramayana', the other great Indian epic. These incidents apparently describe the beginnings of incursions into Ceylon by more civilized tribes of which one has become historical.

In the fifth, possibly the sixth century B.C., a company of invaders found their way to the Island under a leader named Vijaya. In due course, they overcame the aboriginal tribes, and formed a nation of their own which survives to this day as the Sinhalese nation.'(Blaze 1924).

Among the peoples of Ceylon the Veddahs have proved to be of the greatest interest to anthropologists. 'The Veddah country at the present day is limited to a roughly triangular

tract lying between the eastern slopes of the central mountain massif and the sea.' (Seligmann 1911). This race is quite distinct from the other peoples of Ceylon. A large majority of population including the Veddahs which are clearly related to the Dravidians of southern India with whom they are also related linguistically. Buxton (1925) states 'There is also another element in the population which Haddon believes is akin to what he describes as the Indo-Afghans. Risley's Indo-Aryan, modified by contact with Veddah.' Ceylon is in a way at the very end of Southern Asia, and has an admixture of most of the faces which have at various times poured into India.

It has sometimes been argued that cranial collections from India are likely to be not representative of the Indian population at large, since in the principal non-Moslem communities cremation is the regular method of disposal of the dead. In fact, however, there have always been so many exceptions to this rule that no difficulty has existed in obtaining skulls representing all sections of the population. The available records regarding the material used in this study leave us in no doubt as to the source of each and every specimen.

Plate No. 1 Vol. II, shows a map of India, Ceylon and neighbouring countries, and gives the sites of origin of the crania used in this study. Each such site is marked with the letter S. The Indian and Ceylonese material used in the present study has been well documentated, and is known to originate from this area.

Indian Cranial series:

Turner (1900) gives an account of 65 male skulls 16 of which are of the Dravidian tribes 13 of Munda and Kol, 5 of Bhumij and Turi race, 6 of Juanga and various tribes or castes and 25 of Oriya which he divided into two groups comprising 22 and 3 crania respectively.

A comparison is made in Table XVIII between the means of some of the important characters of Type I 1, Type I 11 and Type I 111 of the Indian series with the means given by Turner for the Dravidian skulls recorded by him.

TABLE XVIII./

TABLE XVIII.

Character	Type II	Type III	Type IIII	Turner Series
C.L.	173.67	180.54	177.14	177.5
C.B.	132.87	128.00	128.94	126.5
C.I.	76.8	72.30	72.30	71.2
B.B.H.	133.83	133.97	131.56	135.0
L.H.I.	76.71	73.82	73.9	76.0
M.F.B.	94.0	93.89	91.12	-
B.B.	127.29	124.54	123.85	121.5
U.F.I.	51.46	52.00	51.55	50.2
L.O.I.	79.92	78.46	79.00	83.0
N.I.	46.42	48.79	48.90	53.4

Inspection of Table XVIII shows that the Turner series of crania agrees most closely with Type I III, the mean values for cranial and byzygomatic breadth being indeed even lower in the Turner series. In the basi-bregmatic height, however, the Turner series considerably exceeds I III, attaining a hypsicranial mean length-height index as in Type I 1. The high nasal index at the Turner series is also noteworthy. This difference can hardly be due to variations of technique; it is possible that it reflects the presence in the Turner series of unrecognised samples of the 'negroid' group of South Indian crania to which reference has been made.

The remaining crania examined by Turner fall in the same range of measurement as that recorded for his Dravidian series except for the cranial index in the 25 Oriya skulls in which 3 are recorded as brachycranial (range of cranial index is from 80.8 to 88.2), and 22 are recorded dolichocranial (range of cranial index is from 66.7 to 79.6) by him.

Turner (1906) further gives an account of 7 male Tamil Sudra, 4 of male Pariahs, 14 of male Thugs and one male Badaga, all well documented crania.

Table XIX shows the means of some of the important characters of Type I 1, Type I 11 and Type I 111 of the Indian group with the means of the characters given by Turner for his two Tamil series here labelled A and B.

TABLE XIX./

TABLE XIX.

Character	Type II	Type III	Type IIII	A Tamil Series (3)	B Tamil Series (4)
C.L.	173.67	180.54	177.14	174	174.7
C.B.	132.87	128.00	128.94	141	130.5
B.B.H.	133.83	133.97	131.56	140	136
H.C.	488.34	496.60	490.60	507	493.2
L.H.I.	76.71	73.89	73.90	80.6	77.9
C.I.	76.80	72.30	72.30	81.0	74.7

In Table XIX comparison of the mean dimensions of the Tamil series A with Tamil series B shows that the mean length is similar in both groups, but the mean cranial breadth, height and horizontal ~~are~~ circumference are distinctly greater in the A series. Comparison of Turner's measurement of both Tamil series with the measurements in the Indian series reveals that all the three types are similar to Tamil

series B in regard to the means of some of the measurements. If in addition the cranial indices are considered then Type I 1 approximates more closely than types I 11 and I 111 to the Tamil series B means which are extremely close in regard to cranial length, cranial breadth, basion-bregmatic height and horizontal circumference.

A comparison of the characteristics of Dravidian tribes and Tamil crania from Madhya Pradesh (Central Province) and Southern India has been made by Turner (1906), who says, 'In both series the crania were elongated and dolichocephalic, an occasional cranium having an index in the lower term of the mesaticephalic group; in both the nasal index was platyrrhine or mesorrhine, a leptorrhine index being exceptional; in both the upper jaw was orthognathic, in the Tamils no cranium was prognathous, and in the previous Dravidian series only one in thirty six crania had so high an index; in both the prevailing orbital index was low or microseme; in the previous series the mean maxillo-facial index was low or chamaeprosopic, in the Tamils the mean index was

with a wide variation in each series, was in the mean brachyuranic.'

The other Turner series is of 4 skulls of male Pariahs. Turner (1906) says, 'A feature in this series of skulls was the small range of variation in most of their important dimensions, which pointed to a uniformity in type.' Comparison is made in Table XXX between the means of some of the important characters of Type I 1, Type I 11 and Type I 111 of the Indian series with those given by Turner for his Pariah series.

TABLE XXX.

Character	Type I 1	Type I 11	Type I 111	Pariah series
C.L.	173.67	180.54	177.14	175.5
C.B.	132.87	128.00	128.94	126.5
B.B.H.	133.83	133.97	131.56	131
H.C.	488.34	496.60	490.60	489.5
L.H.I.	76.71	73.82	73.90	74.6
C.I.	75.85	70.50	72.44	72.1
U.F.I.	51.46	52.00	51.55	49.6
N.I.	46.42	48.79	48.90	54.7

From an inspection of the Table XIX it will be seen that Type I 111 is nearly similar to

the Pariah series in cranial length, cranial breadth, basion-bregmatic height, length-height index and upper facial index and horizontal circumference. The other Indian types show fewer similar characters.

The skulls of fourteen Thugs form another of Turner's series. He examined and recorded the mean measurements of these skulls which are compared below in Table XXI with Indian group comprising of Type I 1, Type I 11 and Type I 111.

TABLE XXI

Character	Type I 1	Type I 11	Type I 111	Thug series
C.L.	173.67	180.54	177.14	179
C.B.	132.87	128.00	128.94	130.6
B.B.H.	133.77	133.83	133.97	130.7
C.I.	75.83	70.50	72.44	72.9
L.H.I.	76.71	73.82	73.90	73.3
N.I.	46.42	48.79	48.90	49.8
L.O.I.	79.92	78.46	79.00	85.5

The inspection of Table XXI reveals that the means of several characters approximates to each other in Types I 111 and I 11 and the Thug series. However, Type I 1 differs from it.

The other series of cranium examined by Turner consists of three Bhill crania from Rajasthan (mentioned Alirajpur state by Turner). He (1913) records the measurements of these crania and gives the means of some of the characters which are compared in Table XXII with Indian series comprising Type II, Type I 11 and Type I 111.

TABLE XXII.

Character	Type I 1	Type I 11	Type I 111	Bhil series
C.L.	173.67	180.54	177.14	173
C.B.	132.87	128.00	128.94	126.1
C.I.	75.83	70.50	72.44	72.9
B.B.H.	133.83	133.97	131.56	124.8
L.H.I.	76.71	73.82	73.90	72.1
B.H.I.	100.71	104.21	101.76	98.0
C.F.I.	95.79	96.93	95.75	67.3

The comparison as made from above in Table XXII shows that there is a marked difference between the means of the Indian series and that of the Bhil series. However, it will be seen that the Bhil cranium falls into the dolichocranial group along with types I 11 and I 111.

Tildesley (1920 - 21) provides measurements of a Hindu series, regarding which she states,

'The final table has been confined to crania from the North Eastern part of India, mainly Bengal, but including a few from round Benares, Allahabad being our Western limit.'

A larger pooled Hindu series is provided by Woo and Morant (1932). These series are compared with the three Indian types of this study in Table XXIII.

TABLE XXIII./

TABLE XXIII.

Character	Type I 1	Type I 11	Type I 111	Tildesley's (Hindu series)	Woo and Morant (Pooled Hindu series)
C.L.	173.67	180.54	177.14	175.4(33)	176.3(91)
C.B.	132.87	128.00	128.94	132.3(69)	132.3(91)
C.I.	75.83	70.50	72.44	75.8(33)	75.1(91)
B.B.H.	133.83	133.97	131.56	131.5(10)	133.3(91)
L.H.I.	76.71	73.82	73.90	75.8(10)	75.7(91)
M.F.B.	94.00	93.89	91.12	92.4(10)	92.1(91)
U.F.H.	68.08	65.36	64.38	63.8(9)	66.4(61)
B.B.	127.29	124.54	123.85	126.8(32)	124.3(79)
U.F.I.	51.46	52.00	51.55	-	-
L.O.I.	79.92	74.46	79.00	86.3(45)	-
N.I.	46.42	48.79	48.90	49.7(43)	50.6(88)

Inspection of Table XXIII reveals that the mean characters of Tildesley's Hindu series are very close to those of Type I 1, except that the face is shorter and the nose proportionately broader; in these respects Tildesley's series approaches Type I 111. Woo and Morant's series takes up a position more clearly intermediate between Types I 1 and I 111, having a greater cranial length and smaller facial breadth than Tildesley's series.

Tildesley (1920 - 21) has also recorded a series 'brought over by Dr. Short from Madras in 1878, and belonging chiefly to the Maravar tribe, a Dravidian stock from the Madura district of the Madras Presidency.' The available means for this series (Table XXIV) place it midway between Type I 1 and Type I 111. It differs conspicuously from Turner's so-called Dravidian series, being both shorter and broader. This discrepancy seems to indicate that there is no unity of type among the Dravidian peoples.

Harrower (1928) has recorded a Tamil series (Table XXIV). The male skulls of this series have been used in the present study. Morphologically they can be distributed among all three of the Indian types. It is therefore not surprising that the means of this series place it intermediate between Type I 1 and

TABLE xxiv

Character	Type I 1	Type I 11	Type I 111	Tildesley's Series (Maravar)	Harrower Series (Tamil)	Turner Series (Dravidian)	Turner Series (Tamil) A	Turner Series (Tamil) B	Woo and Morant (Veddah pooled)
C.L.	173.67	180.54	177.14	175.6(21)	179.6	177.5	174	174.7	178.6(39)
C.B.	132.87	128.00	128.94	131.4(28)	131.5	126.5	141	130.5	128.5(54)
C.I.	75.83	70.50	72.44	74.6(21)	73.45	71.2	81.0	74.5	72.0(39)
B.B.H.	133.83	133.97	131.56	-	136.28	135	140	136	133.2(26)
L.H.I.	76.71	73.82	73.90	-	76.21	76	80.6	76.5	73.4(28)
M.F.B.	94.00	93.89	91.12	93.2(21)	95.17	-	-	-	91.0(36)
B.B.	127.29	124.54	123.85	124.4(21)	127.8	121.5	-	-	124.4(34)
U.F.I.	51.46	52.00	51.55	-	50.70	50.2	-	-	-
L.O.I.	79.92	78.46	79.00	-	81.65	83	-	-	-
N.I.	46.42	48.79	48.90	51.7(38)	51.64	53.4	-	-	52.2(22)

Types I ll and I lll. These Tamil crania are larger in most dimensions than Turner's Dravidians or Tildesley's Maravar; in the braincase characters they agree with Turner's Tamil B series.

The pooled Veddah series of Woo and Morant (1931) takes up an intermediate position between Type I ll and Type I lll. It is clearly almost impossible to establish any major metrical criterion for distinguishing Veddah from other South Indian crania.

The clear-cut differences between Indian and both South East Asian and Chinese crania establish the Indian series as the easternmost part of an essentially Western block of cranial types. It is therefore legitimate to compare the Indian types with those recognised by Angel (1944) in his eastern Mediterranean material. Three of the six types recognised by him, Type F (Dinaric-Mediterranean), Type B (Classic Mediterranean), and Type D (Nordic-Iranian), show morphological resemblances to the Indian types. The mean measurements of these series are set out in Table XXV. The greatest degree of resemblance is found between Type I ll and Angel's Type B; most of the means of these two series are very similar, but the Mediterranean series has a considerably larger cranial breadth. Angel's Types D and F are both considerably larger in almost all dimensions than any of the Indian series.

TABLE ~~XXIV~~ XXV.

Character	Type F	I 1	Type B	I 11	Type D	I 111
H.C.	510.9(16)	488.34	506.9(41)	496.60	525.9(39)	490.60
S.A.	368.7(16)	358.18	366.7(43)	366.75	381.6(36)	361.80
F.A.	126.3(12)	125.63	123.4(33)	128.46	128.3(39)	125.58
P.A.	128.5(12)	126.88	129.0(32)	128.43	129.6(36)	124.20
O.A.	118.7(11)	106.75	116.1(27)	110.50	123.2(32)	111.80
T.A.	309.9(17)	316.00	302.0(40)	309.54	312.6(37)	306.60
C.O.	181.7(19)	173.67	181.8(54)	180.54	189.2(44)	177.14
C.B.	142.7(18)	132.87	135.3(58)	128.00	140.3(43)	128.94
B.B.H.	135.4(16)	133.83	131.1(43)	133.97	135.0(36)	131.56
B.N.L.	100.8(15)	98.54	98.0(41)	99.89	102.7(34)	98.70
B.B.	133.9(18)	127.29	125.5(24)	124.54	131.6(33)	123.85
M.F.B.	95.2(17)	94.00	93.2(47)	93.89	97.7(45)	91.12
F.C.	112.2(11)	109.38	109.1(29)	111.00	113.8(36)	108.06
P.C.	114.3(12)	110.17	115.2(28)	114.07	116.6(33)	111.24
O.C.	98.7(12)	90.17	96.3(24)	91.64	101.5(27)	92.68
B.P.L.	96.0(15)	92.50	93.8(28)	95.18	97.4(33)	91.86
U.F.H.	71.7(19)	68.08	66.7(30)	65.36	71.1(37)	64.38
N.H.	52.0(19)	49.79	49.2(33)	49.25	52.0(36)	48.42
N.B.	24.5(19)	23.17	23.8(31)	24.18	24.8(37)	23.76
L.O.H.	33.1(15)	31.96	32.2(31)	31.00	32.8(34)	30.82
L.O.B.	39.7(15)	39.83	38.1(33)	39.22	39.7(34)	38.86
B.Br.	98.7(17)	95.35	95.8(32)	95.82	98.6(32)	94.83
C.I.	78.6(18)	75.83	74.6(54)	70.50	74.1(43)	72.44
L.H.I.	74.3(16)	76.71	72.1(72)	73.82	71.7(36)	73.90
B.H.I.	94.8(16)	100.71	96.3(42)	104.21	96.3(36)	101.76
F.P.I.	66.5(16)	73.54	68.8(46)	75.00	69.7(41)	72.69
C.F.I.	93.7(17)	95.79	92.4(24)	96193	93.4(33)	95.75
U.F.I.	53.3(18)	51.46	52.8(21)	52.00	54.3(32)	51.55
L.O.I.	84.5(15)	79.92	84.1(30)	78.46	83.6(33)	79.00
N.I.	46.9(19)	46.42	48.4(31)	48.79	48.1(36)	48.90

A consideration of the Egyptian cranial series tabulated by Pearson and Davin (1924) has shown that none of them resemble any of the Indian series as closely as Angel's Type B does Type I 11. The differences are so great that it seems unnecessary to reproduce Pearson and Davin's measurements here. The one point of significance which emerges is that except for Angel's Type B, all these Mediterranean series are conspicuously larger in almost every dimension than the Indian series. This emphasises the small size and predominant narrowness of the Indian cranium.

China and Tibet area:

The Chinese Republic extends over an area which probably extends four million square miles and embraces the eighteen provinces and the Island of Hainan and has a population of four hundred million. The population of China today is far from uniform. Although the Chinese themselves comprise the great majority, there is in addition in the north a not inconsiderable Manchu element, while in the south there is considerable non-Chinese element consisting of aboriginal people called "Miaotse" by the Chinese together with the peoples of Tibeto-Burmese speech, like the Lolo and other tribes of the Western marches.

'The published data on crania and the measurements on the living, both published and unpublished, seem to indicate a broad division of the present population into a northern and a southern or more strictly, north-eastern and south-eastern group.' Dixon (1923). Buxton (1925) states, 'Morant believes that the southern Chinese link up in three directions, other than their linkage with the northern Chinese. First, they are connected to what he has described as Tibetan A. Secondly, they are linked with the Annamese. The latter people have possibly

mixed with other elements, but as will be seen physically they are hardly to be distinguished except as a local race from the southern Chinese. To the north Morant links the southern Chinese with Japanese. Finally, north Chinese are linked with Koreans.' Plate No. 1, vol. II shows China and the neighbouring countries.

TABLE XXVI./

Table XXV shows the means of some of the important characters of Type C1 and Type C11 of the Chinese group of the present study with the range of measurements of male Chinese crania recorded by Turner (1899) of eleven adult male and two female Chinese skulls. He says, 'I may, however, state that one skull obtained at Chusan was dolichocephalic (index 74.3), seven were brachycephalic, five were mesaticephalic.' And he again says, 'Even if we include all the specimens the cephalic index works out with a mean of 81.2, and if the doubtful specimens be excluded, it is a little higher, and the mean of the entire series is brachycephalic.'

TABLE XXV1.

Character	Type C1	Type C11	Turner Chinese series. Range
C.L.	168.98	179.97	166 - 182
C.B.	143.04	137.00	133 - 150
C.I.	84.20	76.03	74.3-89.3
B.B.H.	135.29	136.36	126 - 144
L.H.I.	79.98	75.67	70.4- 83.9
M.F.B.	91.02	90.85	86 - 100
B.B.	133.39	131.58	124 - 141
U.F.I.	52.81	53.39	47.4- 55.5
L.O.I.	85.35	86.52	76.3- 100
N.I.	45.53	46.55	42.8- 55.3

Inspection of Table XXVI shows that in their means the measurements of the characters shown all fall within the range of measurements recorded by Turner for his Chinese series.

Harrower (1926) studied 36 Hokien male Chinese crania and later (1928) 39 Hylam male Chinese crania. Both these series of crania have been utilised for the present study. The means of the measurements for these two series of Chinese crania and for Type C1 and Type C11 of the present study are given in Table XXVII.

TABLE XXVII./

TABLE XXVII.

Character	Type C1	Hylam (39)	Type C11	Hokien (36)	Tildesley's Chinese Series	Chukchi (Fridolin)
C.L.	168.98	168.25	179.97	179.9	177.1 (84)	181.7 (35)
C.B.	143.04	147.79	137.0	140.9	139.5 (102)	141.2 (35)
C.I.	84.20	87.89	76.03	78.75	78.9 (73)	77.7 (35)
B.B.H.	135.29	135.96	136.36	137.8	136.9 (69)	-
L.H.I.	79.98	80.84	75.67	77.02	72.4 (34)	-
M.F.B.	91.02	92.91	90.85	91.5	93.4 (49)	-
U.F.H.	71.04	70.59	70.82	73.8	-	-
B.Br.	133.39	133.96	131.58	132.6	-	-
U.F.I.	52.81	52.70	53.39	55.67	-	-
L.O.I.	85.35	89.40	86.52	91.94	-	-
N.I.	45.53	49.40	46.55	48.15	48.9 (53)	47.6 (35)

Comparing the means of some of the characters it will be seen from Table XXVII that Type C1 is extremely close to the Hylam and Type C11 to the Hokien series. The differences in the means between the Hylam and C1 and the Hokien and C11 series are due to the inclusion of additional Chinese crania, and perhaps in some cases to differences of technique.

Tildesley's (1920 - 21) material consists of male Chinese crania and Woo and Morant give the data of a male Chukchi series. The means of the data of these series are given in Table XXVII. It will be seen from TableXXVII that Tildesley's Chinese series is intermediate between Types C1 and C11, but much closer to the latter. The Chukchi series is close to Type C11 and even closer to Harrower's Hokien series.

These comparisons emphasise the contrast between the two Chinese groups, which can be typified by Harrower's Hokien and Hylam series. Harrower himself suggests that 'the Hylam Chinese are the product of the blending of Chinese proper from the northern provinces with the aboriginal whose affinities are with the Shans.' If this view is correct, Type C1 should reveal a closer affinity to the South East Asian types than does C11.

It has in fact been found that in many characters, both metrical and morphological, Types Bl and Cll tend to fall together, and likewise Types Bll and Cl. It is however very difficult to decide whether there is a greater degree of resemblance between Bl and Cll or between Bll and Cl. This set of characters is cut across by another, most manifest in the facial skeleton, which associates Cl and Cll and differentiates both from Bl and Bll. (Table XXVIII).

The few Tibetan skulls studied also prove to resemble Type Cll. Morant has measured a larger number of Tibetan skulls (thirty one), but these he has divided into two groups, Tibetan A and Tibetan B. In Table XXVIII the means of these two series are compared with those of both the Chinese and the South East Asian types. The Tibetan B group clearly shows a general correspondence with Types Cll and Bl, although the Tibetan crania are on the average larger and particularly broad-faced. The Tibetan A group, however, does not show an equal degree of correspondence with Types Bll and Cl. It rather takes up an intermediate position between Bl and Bll or between Cl and Cll. There is indeed a much greater similarity between the Tibetan A series and Tildesley's Burmese B series (Table XV).

TABLE XXVIII.

Character	Type C1	Type C11	Type B1	Type B11	Tibetan A	Tibetan B
C.L.	168.98	179.97	177.04	168.64	174.8	185.5
C.B.	143.04	137.0	134.52	137.91	139.4	139.4
C.I.	84.20	76.03	75.55	81.46	79.8	75.3
B.B.H.	135.29	136.36	134.76	133.77	131.2	134.1
L.H.I.	79.98	75.67	75.67	78.91	75.1	72.1
M.F.B.	91.02	90.85	93.21	92.09	92.5	94.3
U.F.H.	71.04	70.82	68.09	69.55	69.4	76.5
B.B.	133.39	131.58	132.03	133.32	130.4	137.5
U.F.I.	52.81	53.39	51.06	51.68	54.48	55.64
L.O.I.	85.35	86.52	82.21	83.05	-	-
N.I.	45.53	46.55	48.09	48.23	49.3	49.4

Buxton (1925) says, 'Morant believes that there are in Tibet at least two distinct races. One of these, that from the southern provinces in the neighbourhood of Sikkim, which he calls Type A, is closely allied to the Southern Chinese, the 'Malayans', and the Burmese.' The other race is the 'Khams Tibetans'.' Morant (1933) in his subsequent paper states that his Tibetan A is intermediate between the Nepalese and Southern Chinese.

Comparisons of Mongoloid with Indian series.

The foregoing comparisons have demonstrated that a belt of related populations, which can be broadly classed as Mongoloid, extends eastwards from Nepal through Tibet to southern China and southwards through Malaya and Indonesia to Borneo. This distribution thus forms an arc enclosing the Indian region on the north and east. The boundary between the Indian region and the enclosing Mongoloid arc constitutes one of the principal racial watersheds of Asia. It can, however, be shown that there has been intermixture of peoples even across this watershed.

TABLE XXIX./

TABLE XXIX.

Character	Type B1	Type B11	Type C1	Type C11	Hindu (Tildesley)	Hindu (Pooled)	Tamil	Maravar
C.L.	177.04	168.64	168.98	179.97	175.4(33)	176.3(91)	179.6	175.6(21)
C.B.	134.52	137.91	143.04	137.00	132.3(69)	132.3(91)	131.5	131.4(38)
C.I.	75.55	81.46	84.20	76.03	75.8(33)	75.1(91)	73.45	74.6(21)
B.B.H.	134.76	133.77	135.29	136.36	131.5(10)	133.3(91)	136.28	-
L.H.I.	75.67	78.91	79.98	76.03	75.8(10)	75.7(91)	76.21	-
M.F.B.	93.21	92.09	91.02	90.85	92.4(10)	92.1(91)	95.17	93.2(21)
U.F.H.	68.09	69.55	71.04	70.82	63.8(9)	66.4(61)	64.8	-
B.B.	132.03	133.32	133.39	131.58	126.8(32)	124.3(79)	127.8	124.4(21)
U.F.I.	51.06	51.68	52.81	53.39	-	-	50.70	-
L.O.I.	82.21	83.05	85.35	86.52	86.3(45)	-	81.65	84.4(17)
N.I.	48.09	48.23	45.53	46.55	49.7(43)	50.6(88)	51.64	51.7(38)

Table XXIX shows the means for the South East Asian and Chinese types of this study in comparison with those of the two Hindu series, the Tamil and the Maravar series. The most conspicuous differences are shown in the cranial breadth, the upper facial height and the byzygomatic breadth, all of whic display a consistently lower mean value in the Indian series.

TABLE XXX./

TABLE XXX./

Character	Type I 1	Type I 11	Type I 111	Burmese A	Burmese B	Burmese C	Malayan	Tibetan A	Tibetan B
C.L.	173.67	180.54	177.14	173.5	173.8	176.7	174.7	174.8	185.5
C.B.	132.87	128.00	128.94	143.7	141.1	140.4	142.2	139.4	139.4
C.I.	75.83	70.50	72.44	82.9	80.4	79.5	81.7	79.8	75.3
B.B.H.	133.83	133.97	131.56	136.0	134.7	139.1	137.4	131.2	134.1
L.H.I.	76.71	73.82	73.90	78.5	76.7	78.9	-	75.1	72.1
M.F.B.	94.00	93.89	91.12	94.3	89.7	90.4	93.4	92.6	94.3
U.F.H.	68.08	65.36	64.38	71.4	68.2	74.5	70.1	69.4	76.5
B.B.	127.29	124.54	123.85	134.0	131.7	126.7	133.2	130.4	137.5
U.F.I.	51.46	52.00	51.55	53.28	51.8	58.8	52.6	54.48	55.64
L.O.I.	79.92	74.46	79.00	-	-	-	-	-	-
N.I.	46.42	48.79	48.90	52.7	51.0	46.3	50.4	49.3	49.5

In Table XXX the means for the three Indian types of this series are compared with those of Tildesley's three Burmese series, of the Malayan, and of the two Tibetan series. The same contrasts are revealed as in the previous table. It is noteworthy, however, that in byzygomatic breadth and in nasal index the Burmese C series departs from the remainder of its group and aligns itself with the Indian type I 1. There is in fact ample reason to suggest that the Burmese C series represents the intrusion of an Indian type into the South East Asian area.

The Naga series and its significance.

This conclusion redirects attention to the Naga area of Assam as constituting a natural bridge between the Indian, North Oriental and South Oriental region. It is in fact the nodal point of the whole territory covered by this survey.

The series of 19 male Naga crania analysed in this study had previously been examined by Turner (1899). He divided them into two series, the Chin Hills and Tonkal Naga. Table XXXI shows the mean measurements of these two series along with the range of three male individuals recorded by Thane (1881). It will be seen that the Tonkal Naga series consists of larger crania than the Chin Hills series, but the two are very similar in form.

TABLE XXXI.

Character	Chin Hills	Tonkal Naga	Thane's series (Range)
C.L.	176.8	180	173 - 179
C.B.	132.5	137.6	129 - 142
C.I.	75.0	76.4	75.0 - 80.2
B.B.H.	129.8	136	133 - 145
L.H.I.	73.4	75.7	73.3 - 81.9
M.F.B.	90	94.7	83 - 110
U.F.H.	-	-	59 - 67
B.B.	127	146	134 - 137
U.F.I.	50.4	52	-
L.O.I.	90.2	92.2	83.3 - 94.1
N.I.	52.1	49.7	46.0 - 59.5

Turner (1899) comments on Thane's Naga series and his own, and says, 'His specimens were, however, shorter than mine for though the mean height and breadth were almost identical in the two series, the mean length of Thane's specimens was 4 mm. less than in mine.' Later on Basu and Guha (1931 quoted by Kitson and Morant); and Kitson and Morant (1933) studied the collection of skulls made during the 1926 expedition organized by the Government of Burma into the Naga hills for the purpose of suppressing the practice of human

sacrificial rites.

In Table XXXII the mean measurements of the male Naga crania of Kitson and Morant are compared with the range of the Naga crania of the present study.

TABLE XXXII.

NAGA

Character	Pooled	Present series (Range)
C.L.	181.3(14)	165 - 189
C.B.	137.9(8)	124 - 144
C.I.	76.9(14)	66.83 - 85.19
B.B.H.	136.6(16)	126 - 143
L.H.I.	76.7(11)	70.16 - 84.60
M.F.B.	92.8(67)	83 - 99
U.F.H.	66.1(60)	63 - 77
B.B.	131.6(45)	117 - 146
U.F.I.	-	-
L.O.I.	84.9(8)	75.79 - 94.86
N.I.	51.4(20)	41.17 - 53.05

This comparison shows that the measurements of the Naga in the present study are distributed very symetrically around the means for the pooled series.

It has already been stated (p.103) that the present series of Naga crania can be divided morphologically into five groups. Two of these, comprising eleven crania in all, resemble the Indian types I 11 and I 111; two others, comprising four crania, resemble one or other of the Chinese types, while the last group of four skulls is similar to the South East Asian type B11.

This small sample therefore contains eleven crania of Indian aspect as against eight Mongoloid. The evidence of the measurements in Table XXXII does not suggest that the present series is grossly typical. It seems therefore that there is a larger Indian element in the Naga group than is allowed for by the generalisation that the Naga 'belong to the great Tibeto-Burman family' (Imperial Gazetteer of India, Vol. XVIII, 1908).

Turner (1899) in his concluding remarks on Naga crania says, 'It would seem, therefore, whilst the Mongolian type of feature prevails, that departures from that type do occur with sufficient frequency to be noticeable. The study of the skulls proves that they also possess some diversities of character.' The present study not only confirms but greatly strengthens this conclusion.

Veddah group in relation to the Indian population:

It has already been pointed out (p.137) that the means of the pooled Veddah series of Woo and Morant (1932) are almost identical with those of the Indian cranial series types I 11 and I 111. Table XXXIII shows the range of the five Veddah skulls studied in comparison with the means of the larger series. It is noteworthy that these skulls tend to be small in comparison with the pooled series.

TABLE XXXIII

VEDDAH

Character	Pooled	Present series (Range)
C.L.	178.6(39)	165 - 178
C.B.	128.5(34)	121 - 128
C.I.	72.6(34)	69.93 - 73.33
B.B.H.	133.2(26)	125 - 134
L.H.I.	73.4(28)	74.56 - 78.81
M.F.B.	91.0	86 - 98
B.B.	124.4	118 - 128
U.F.I.	-	-
L.O.I.	-	-
N.I.	52.2	44.89 - 48.83

As already stated, one of the five Veddah crania examined is indistinguishable from an Indian

cranium of Type I 11, but the other four are morphologically very different from any of the Indian types. The Veddah then is basically a morphologically distinct type, but there has undoubtedly been an infusion of Indian elements into the Veddah stock. Conversely, it has been suggested that the small group of South Indian skulls which present 'negroid' features can be accounted for by the absorption of Veddah elements.

It has been suggested that the Sakai group in Malay represents a remnant of the same aboriginal stock as the Veddah. The four Sakai crania included in this study afford no definite evidence on this subject. As has been pointed out on p.104, these crania have braincase characters similar to Indian Type I 11, and therefore in some respects to the Veddah, but in the face they show features of the Mongoloid types.

Conclusions and Summary

1. The collection of South Asian crania in the Anatomy Department, University of Edinburgh, comprises 277 intact adult male specimens. Of these 36 belong to special groups which cannot be pooled with the remainder, and have been analysed separately. The remaining 241 crania could be divided in the first place into three morphological groups representing major geographic areas:

i. South East Asia (Burma to Borneo) - 55 crania

ii. The Indian peninsula with Ceylon - 102 crania

iii. South China - 84 crania.

This division corresponds to the three primary areas recognised by Woo and Morant (1932).

2. Following Angel's method of Morphological Type Analysis, and grouping the crania by direct visual observation, the series can be further divided into seven distinct morphological types, two in the South East Asian area, designated Type B1 (33 crania) and Type B11 (22 crania), three in the Indian area, designated Type I 1 (24 crania), Type I 11 (28 crania), and Type I 111 (50 crania), and two in the South China area, designated Type C1 (51 crania) and Type C11 (33 crania).

3. The validity of these seven morphological types within the whole series has been tested by analysing

statistically their measurements and indices. A further check is obtained by studying the distribution in these types of morphological characters not used in the original sorting. The characteristics of these seven types are summarised in Table XXXIV.

4. The 36 special crania represent the following groups:

i. Naga of Assam (19 crania)
ii. Veddah of Ceylon (5 crania)
iii. Sakai of Malay (4 crania)
iv. Tibetan (4 crania)
v. South Indian crania presenting distinctive 'negroid' features (4 crania).

5. The Naga crania studied reveal a mingling of Indian, South Asian and Chinese morphological types. The Tibetan skulls correspond to the Chinese type C11. The Veddah skulls, with one exception, are morphologically clearly distinct from the three Indian types. It is possible that the 'negroid' South Indian group is the product of Veddah admixture. The Sakai skulls examined do not throw any clear light on the relationships of this group.

6. Comparing the metrical results of this study with those of previous workers in the same areas,

there is a broad agreement in spite of some divergences in detail. The Indian area is Western or Europoid in its affinities, and is bounded on the north and east by regions whose affinities are in a broad sense Mongoloid. These boundaries constitute a principal watershed in the human geography of South Asia. The Naga area of Assam lies at this watershed, marking a highway by which Indian morphological types have penetrated into South East Asia, a process clearly demonstrated by Tildesley's study of Burmese crania.

Table XXXIV summarizes the Metrical and Morphological type description of the seven types of South Asian Cranial series.

TABLE XXXIV.

Character	South East Asian Type Bl	South East Asian Type Bll
Cranial index	Dolichocranial to mesocranial	Mesocranial to brachycranial
Length-height index	Metriocranial to hypsicranial	Hypsicranial
Upper facial index	Leptoprosopic to mesoprosopic	Leptoprosopic to mesoprosopic
Nasal index	Mesorrhine	Mesorrhine
Left orbital index	Microsemic	Microsemic
Cranial asymmetry	Symmetrical	Normal - reversed
Parietal bosses	Foetal - infantile	Adult
Headform	Pentagonoid - Ovoid	Spheroid
Forehead height	Low, inclined	Low - high, inclined - verticle.
Frontal bosses	Infantile - adult	Infantile - adult
Browridge size	Type I - Type III, Type IV	Type II - Types I and III
Lambdoid flattening	Absent	Present
Parieto-occipital region	Hemispherical	Flat
Ext. Occipital protuberance	Round Tubercle	Round Tubercle
Occipital torus	Absent - small	Absent
Temporal region	Slight - moderate	Moderate - pronounced
Orbit. Form of Margin	Square - rhomboid	Rhomboid - square
Orbital slope	Oblique	Oblique

Character	South East Asian Type B1	South East Asian Type B11
Cheek bones	Medium - large	Large - medium
Projection of Malar	Antero - laterally	Antero - laterally
Prognathism	Slight	Slight
Alveolar prognathism	Absence	Absence
Nasion profile	Concave	Concave - Concavo-convex
Nasal forms	Type I - Type II	Type I
Nasion depression	Moderate	Moderate
Fronto-nasal articulation	Horizontal - Concave	Horizontal - Concave
Configuration of lower margin of nasal aperture	Infantile - prenasalis fossa	Prenasalis fossa
Dental arcade	Elliptical	Semi-elliptical
Pharyngeal fossa	Absence - medium	Absence - medium
Posterior glenoid process	Medium size	Medium size

Indian type I 1	Indian type I 11	Indian type I 111
Concave	Concavo-convex or concave	Concave - concavo-convex
Type II - Type I	Type II - Type I	Type II - Type I
Moderate	Moderate	Moderate
Concave - horizontal	Concave	Concave
Prenasalis fossa	Prenasalis fossa	Prenasalis fossa
Semi-elliptical	Divergent, semi-elliptical, elliptical	Elliptical
Medium - deep	Medium - absent	Medium - deep
Slight - medium	Medium	Slight - medium

Indian type I l	Indian type I ll	Indian type I lll
Dolichocranial - mesocranial	Dolichocranial	Dolichocranial
Metriocranial - hypsicranial	Metriocranial	Metriocranial
Leptoprosopic - mesoprosopic	Mesoprosopic	Leptoprosopic - mesoprosopic
Leptorrhine	Mesorrhine	Mesorrhine
Microsemic (below 80)	Microsemic (between 80)	Microsemic (below 80
Symmetrical	Symmetrical	Symmetrical
Adult - infantile	Foetal - adult, infantile	Infantile - foetal
Spheroid - sphenoid	Pentagonoid - ellipsoid, ovoid	Ovoid - pentagonoid
Low - high, vertical - inclined	Low, inclined - vertical	Low, vertical
Foetal - infantile, adult	Adult	Adult
Type II	Type II, Type III or Type IV	Type II - Type III
Present	Absent	Absent
Protuberant	Protuberant	Protuberant
Round tubercle - sharp edge	Sharp edge - round tubercle	Round Tubercle
Small - medium	Small	Absence
Moderate	S light - moderate, flat most frequent	Moderate - slight
Oblong - rhomboid	Oblong - rhomboid	Square, rhomboid, oblong and ellipsoid
Oblique	Oblique	Oblique
Small - medium	Small	Small - medium
Laterally	Laterally	Laterally
Slight	Slight	Slight
Absence	Present in almost half the specimens	Rarely present

Chinese type C1	Chinese type C11
Concave	Concave
Type I - Type II	Type I, Type II
Moderate	Slight
Concave - horizontal	Horizontal - concave
Prenasalis fossa - anthropine	Prenasalis fossa
Divergent, semi-elliptical, Elliptical	Divergent - Elliptical
Absence	Absence - medium size
Slight - medium	Medium size.

Chinese Type C1	Chinese Type C11
Brachycranial	Dolichocranial - mesocranial
Hypsicranial	Metriocranial - hypsicranial
Mesoprosopic	Mesoprosopic
Leptorrhine	Leptorrhine
Mesosemic	Mesosemic
Normal - reversed	Symmetrical
Adult	Foetal - infantile
Spheroid	Ovoid
Low - high, inclined	low, inclined
Infantile	Infantile - adult
Type II - Type I	Type I - Type II
Absence	Absence
Flat	Hemispherical
Round tubercle	Round tubercle
Variable	Medium - pronounced
Pronounced - moderate	Moderate - pronounced
Square - rhomboid	Rhomboid - square
Oblique	Oblique
Medium - large	Medium - large
Antero - laterally	Antero - laterally
Some total - pronounced	Slight - pronounced
Present in 5o% of the specimens	Less present than absent

ABBREVIATIONS

H.C.	Horizontal circumference
S.A.	Sagittal arc
F.A.	Frontal arc
P.A.	Parietal arc
O.A	Occipital arc
T.A.	Transverse arc
C.L.	Cranial length
C.B.	Cranial breadth
B.B.H.	Basion-bregma height
B.N.L.	Basion-nasion length
B.B.	Bizygomatic breadth
M.F.B.	Minimum frontal breadth
F.C.	Frontal chord
P.C.	Parietal chord
O.C.	Occipital chord
B.P.L.	Basion-prosthion length
F.M.L.	Foramen magnum length
F.M.B.	Foramen magnum breadth
B.	Bimaxillary breadth
U.F.H.	Upper facial height
N.H.	Nasal height
N.B.	Nasal breadth
L.O.H.	Left orbital height
L.O.B.	Left orbital breadth
B.Br.	Biorbital breadth
E.B.	Ext. Biorbital breadth
C.I.	Cranial index
L.H.I.	Length-height index
B.H.I.	Breadth-height index

F.P.I.	Fronto-parietal index
C.F.I.	Cranio-facial index
U.F.I.	Upper facial index
N.I.	Nasal index
L.O.I.	Left orbital index

ACKNOWLEDGEMENTS

I wish to express my gratitude to Professor G. J. Romanes and Dr. L. H. Wells for the helpful advice and criticism which I have received throughout my work. I owe more than I can ever acknowledge.

I should like to express my sincere thanks to Emeritus Professor J. C. Brash for his keen interest in my work. I am indebted to Dr. H. W. Taylor for the co-operation and constant encouragement.

I also wish to thank Mr J. Borthwick who has continuously helped me in photographic work.

REFERENCES

ABBIE, A.A. 1947. Headform and Human Evolution. J. Anat. Lond. Vol. 81, pp. 233 - 258.

ALLEN, H. 1890. A Clinical Study of the Skull. Washington: Smithson Misc. Coll. pp. 1 - 77.

ALLEN, H. 1894 - 96. Crania from the Mounds of the St. John's River Florida. J. Acad. Nat. Sci. Philad. Vol. 10, pp. 367 - 448.

ANGEL, J.L. 1943. Ancient Cephallenians. Amer. Phys. Anthrop., n.s. Vol. 1, pp. 229 - 260.

ANGEL, J.L. 1944. A racial analysis of the Ancient Greeks. Amer. J. Phys. Anthrop., n.s. Vol. 2, pp. 329 - 376.

ANGEL, J.L. 1945. Skeletal Material from Attica Hesperia, Vol. 14, pp. 279 - 363.

ANGEL, J.L. 1952. The Human Skeletal Remains from Hotu Cave, Iran. Proceedings American Philosophical Soc. Vol. 96, pp.258 - 269.

ANNANDALE, N. and ROBINSON, H.C. 1903. Fasciculi Malayenses Anthrop. Part I. University Press, Liverpool. Longmans, Green and Co.

BANERJEE Gauranganath 1921. India as known to the Ancient World. Humphrey Milford, Oxford Univ. Press.

BLAZE, L.E. 1924. Ceylon, Its History, People, Commerce, Industries and Resources. Plate Ltd., Colombo.

BOLK, L. 1929. Origin of the Racial Characteristics in Man. Amer. J. Phys. Anthrop., Vol. 13, pp. 1 - 28.

v. BONIN, G. 1931. Beitrag Zur Kraniologie Ost-Asian Biom. Vol. 23, pp. 52 - 113.

BRASH, J.C. and YOUNG, Mathew. 1935. The Anglo-Saxon Skulls from Bidford-on-Avon and Burwell, with comparison of their principal characters and those of the Anglo-Saxon Skulls in London Museum. Part 1. The Bidford-on-Avon Anglo-Saxon Skulls, Vol. 27, pp. 373 - 387.

BRIGGS, L. Cabot 1955. The Stone Age Races of North West Africa. American School of Prehistoric Research Peabody Museum, Harvard University. Bulletin No. 18. Cambridge, Massachusetts, U.S.A.

BRYCE, T.H. and YOUNG, M. 1917. Observations on Metopism. J. Anat. Lond. Vol. 12. pp. 153 - 166.

BUXTON, L.H.D. 1925. The Peoples of Asia. London, K. Paul, Trench, Trubner & Co. Ltd.

BUXTON & Morant G.M. 1933. The Essential Craniological Technique. J. Anthrop. Inst. Vol. LXIII, pp. 19 - 48.

CAMERON, John 1934. The Skeleton of British Neolithic Man. London, Williams & Norgate Ltd.

CHILDE, Gordon V. 1939. India and the West before Darius. Antiquity Vol. 13, pp. 5 - 15.

CRESSEY, C.P. 1952. Asia's lands and peoples. McGraw-Hill.

CROOKE, W. 1914. The Stability of Caste and Tribal Groups in India. J. Anthrop. Inst. Vol. XLIV, pp. 270 - 280.

CUNNINGHAM, D.J. 1908. The Evolution of the Eye brow Region of the forehead, with special reference to the Excessive Supra-Orbital Development in the Neanderthal Race. Trans. Roy. Soc. Edin. Vol. 46, pp. 283 - 311.

CUNNINGHAM, D.J. 1951. Text Book of Anatomy. (Editor: J.C. Brash) London. Oxford Univ. Press.

DIXON, R.B. 1923. The Racial History of Man. New York, Charles Scribner's Sons.

DUCKWORTH, W.L.H. 1904. Morphology and Anthropology. Cambridge Univ. Press.

FISHER, R.A. and YATES, F. 1938. Statistical Tables. Edinburgh: Oliver and Boyd.

GATES, R.R. 1948. Human Ancestry: Cambridge Mass. Harvard Univ. Press.

GEAR, J.H. 1929. Cranial Form in the Native Races of South Africa. S. Afr. J. Sci. Vol. 26, pp. 684 - 497.

GODDEN, Gertrude M. 1896. Naga and Other Frontier Tribes of North-East India. J. Anthrop. Inst. Vol. 26, pp. 161 - 209.

HARROWER, G. 1923. Variations in the Region of the Foramen Magnum. J. Anat. Lond. Vol. 57, pp. 178.

HARROWER, G. 1926. A Study of the Hokien and the Tamil Skull. Trans. Roy. Soc. Edin. Vol. 54, pp. 573 - 599.

HARROWER, G. 1928. A Study of the Crania of the Hylam Chinese Biom. Vol. 20B, pp. 245 - 278.

HOOTON, E.A. 1925. The Asymmetrical Character of Human Evolution. Amer. J. Phys. Anthrop. Vol. 8, pp. 125 - 140.

HOOTON, E.A. 1925. The Ancient Inhabitants of the Canary Islands. Harvard African Studies, Vol. 7, Cambridge, Mass.

HOOTON, E.A. 1926. Methods of Racial Analysis. (Vice-Presidential Address to section H.A.A.A.S.) Sci. Vol. 63, pp. 75 - 81.

HOOTON, E.A. 1954. Up from the Ape. 5th printing New York: The macmillan Co.

HOWELLS, W.W. 1936. Some uses of the Standard Deviation in Anthropometry. Human Biol. Vol. 8, pp. 592 - 600.

INDIA, 1908. The Imperial Gazetteer. Vol. XVIII.

INDIA, 1954. Annual Review. Information Service of India.

IYER, L.A. Krishna 1936. Anthropometry of the Primitive Tribes of Travancore. Proceedings Indian Academy of Sciences, Vol. 4, pp. 494 - 514.

KEEN, J.A. 1947. A Statistical Study of the Differences between Bantu Hottentot and Bushman Skulls Year-Book of Phys. Anthrop. Vol. 3, pp. 34 - 43.

KEEN, J.A. 1950. A Study of the Difference between Male and Female Skulls. Amer. J. Phys. Anthrop. n.s. Vol. 8, pp. 65 - 80.

KEITH, Sir A. 1916. On Certain Factors concerned in the Evolution of Human Races (Presidential address) J. Roy. Anthrop. Inst. Vol. XLVI, pp. 10 - 33.

KITSON, E & MORANT, G.M. 1933. A Study of the Naga Skull. Biom. Vol. 25, pp. 1 - 20.

KROGMAN, W.M. 1932. The Morphological Characters of the Australian Skull. J. Anat. Lond. Vol. 66, pp. 399 - 413.

KROEBER, A.L. 1923. Antropology ~~Georges~~. Harrap & Co. Ltd., London.

MACALISTER, J. 1896. The Apertura Pyriformis. J. Anat. Physiol. Vol. 32, pp. 223 - 230.

MACALISTER, J. 1898. The Causation of Brachi- and Dolichocephaly. J. Anat. Physiol. Vol. 32, pp. 334 - 340.

MARTIN, R. 1928. Lehrbuch der Anthropologie in systematischer Darstellung mit beronderer Berücksichtigung der anthropologischen Methoden. Vol. 2, Jena: Fischer.

MONTAGU, M.F. Ashley, 1943. An Introduction to Physical Anthropology. Springfield, Illinois: Charles C. Thomas.

MONTAGU, M.F. Ashley, 1938. Ageing of the Skull. Amer. J. Phys. Anthrop. Vol. 23, pp. 355 - 375.

MONTAGU, M.F. Ashley, 1937. The Medio-Frontal suture and the problem of Metopism in Primates. J. Roy. Anthrop. Inst. Vol. LXVII, pp. 157 - 202.

MORANT, G.M. 1922-23. A First Study of the Tibetan Skull. Biometrika Vol. 14. pp. 193 - 260.

MORANT, G.M. 1924. A Study of Certain Oriental Series of Crania including the Nepalese and Tibetan series in the British Museum (Nat. Hist.). Biom. Vol. 16, pp. 1 - 105.

MORANT, G.M. 1939. Mapumgubwe. II, Skeletal Remains. Antiquity. Vol. 13, pp. 335 - 341.

MORANT, G.M. 1929. A Contribution to Basque Craniometry. Biometrika. Vol. 21, pp. 67 - 84.

NEUMANN, Georg K. 1952. Archeology and Race in the American Indian Yearbook of Physical Anthropology. Vol. 8, pp. 213 - 242. Wenner-Gren Foundation for Anthropological Research, Inc., New York.

NEUMANN, Georg K. 1952. Measurements and Indices of American Indian Varieties. Yearbook of Physical Anthropology, Vol. 8, pp. 243 - 255.

PANIKKAR, 1954. Asia and Western Dominance. London. Allen & Unwin Ltd.

PEARSON K. & DAVIN A.G. 1924. On the Biometric Constants of the Human Skull. Biom. Vol. 16, pp. 328 - 363.

PARSONS, F.G. 1930. Alveolar and Facial Prognathism, J. Anat. Lond. Vol. 65, pp. 149 - 151.

PRASAD, Ishwari, 1953. History of India. Vol. 1 and Vol. 11.

RISLEY, H. 1915. People of India. Calcutta: Thaker Spink & Co.

SCHAEFFER, B. 1950. The Functional Evaluation of Adaptive Morphological Characters. Amer. J. Phys. Anthrop. n.s. Vol. 8, pp. 281 - 294.

SELIGMAN, C.G. & SELIGMAN Brenda 1911. The Veddas. Cambridge University Press.

SERGI, G. 1894. The Varieties of the Human Species. Smithsonian Institution, Washington.

SHAW, J.C. Middleton 1931. The Teeth, the Bony palate and the Mandible in Bantu Races of South Africa. London, John Bale, Sone & Danielsson Ltd.

SNEDECOR, G.W. 1950. Statistical Methods. 4th Ed. Iowa State College Press.

STEFFENSEN, J. 1953. The Physical Anthropology of the Vikings. J.R. Anthrop. Inst. Vol. 83, pp. 86 - 97.

STOESSIGER, Brenda 1927. A Study of the Badarian Crania recently excavated by the British school of Archaeology in Egypt. Biom. Vol. 19. pp.110 -150.

THANE, G.D. 1881. On some Naga Skulls. J. Anthrop. Inst. Vol. XI, pp. 215 - 218.

THOMSON, A. 1903. A Consideration of some of the more Important Factors Concerned in the Production of Man's Cranial Form. J. Roy. Anthrop. Inst. Vol. 33, pp. 135 - 155.

THOMSON, Arthur 1889. On the Osteology of the Veddahs of Ceylon. J. Anthrop. Inst. Vol. 19, pp. 125 - 159.

TILDESLEY, M.L. 1920-21. A First Study of the Burmese Skull. Biom. Vol. 13, pp. 176 - 262.

TORGERSEN, J. 1951. The Developmental Genetics and the Evolutionary Meaning of the Metopic suture. Amer. J. Phys. Anthrop. n.s. Vol. 9, pp. 193 - 210.

TREVOR, J.C. 1947. The Physical characters of the Sandawe. J.R. Anthrop. Inst. Vol. 77, pp. 61 - 78.

TREVOR, J.C. 1950. Anthropometry. Offprinted from Chamber's Encyclopaedia. New Edition, Vol. [redacted], l. George Newnes Ltd.

TURNER, Sir. W. 1884 - 1886. The Comparative Osteology of Races of Men (comprising Parts 29 and 47 of the Zoological Series of Reports of the Scientific Results of the Voyage of H.M.S. Challenger). Edinburgh: H.M.S.O.

TURNER, Sir. W. 1899. Contributions to the Craniology of the people of the Empire of India. Part 1. The Hill Tribes of the North-East Frontier and the People of Burma. Trans. Roy. Soc. Edin. Vol. 39, pp. 703 - 747.

TURNER, Sir W. 1900. Contributions to the Craniology of the People of the Empire of India. Part 11. The Aborigines of Chuta Nagpur and of the Central Provinces, the People of Orissa, the Veddahs and Negritos. Trans. Roy. Soc. Edin. Vol. 40, pp. 59 - 129.

TURNER, Sir. W. 1906. Contributions to the Craniology of the People of the Empire of India. Part 111. Natives of the Madras Presidency, Thugs, Veddahs, Tibetans and Seistanis. Trans. Roy. Soc. Edin. Vol. 45, pp. 291 - 309.

TURNER, Sir W. 1907. A Contribution to the Craniology of the Natives of Borneo, the Malays, the Natives of Formosa, and the Tibetans. Trans. Roy. Soc. Edin., Vol. 45, pp. 781 - 818.

TURNER, Sir W. 1913. Contributions to the Craniology of the People of the Empire of India. Part IV. Bhils, Frontier Tribes of Burma, Pakokku Tribes, South Shan Tribes, Tibetans. Trans. Roy. Soc. Edin., Vol. 49, pp. 705 - 734.

WEIDENREICH, F. 1945. The Brachycephalisation of Recent Mankind. Sth. West. J. Anthrop. I.(1). (Anthropological Papers of Franz Weidenreich 1939 - 1948). New York, Viking Fund Inc.

WEIDENREICH, F. 1947. The Trend of Human Evolution. Evolution. [redacted].I. 221-236 (Anthropological Papers of Franz Weidenreich 1939-1948.) New York, Viking Fund Inc.

WOO, Ju-Kang. Racial and Sexual Differences in the frontal curvature and its relation to metopism. Amer. J. Phys. Anthrop. n.s. Vol. 7, pp. 215 - 226.

WOO, T.L. & MORANT, G.M. 1932. A Preliminary Classification of Asiatic Races based on Cranial Measurements. Biom. Vol. 24, pp. 108 - 134.

WOOD JONES, F. 1931. The Non-metrical Morphological Characters of the Skull as criteria for Racial Diagnosis. Part 1. General Discussion of the Morphological Characters employed in Racial Diagnosis. J. Anat. Lond. Vol. 65, pp. 179 - 195.

WOOD JONES, F. 1931. Part 11. The Non-metrical Morphological Characters of the Hawaiian Skull. J. Anat. Lond. Vol. 65, pp. 368 - 378.

WOOD JONES, F. 1931. Part 111. The Non-metrical Morphological Characters of ~~skulls of the Prehisteric Inhabitants of Guam~~ the Northern Chinese skull. J. Anat. Lond. Vol. 68, pp. 96 - 108.